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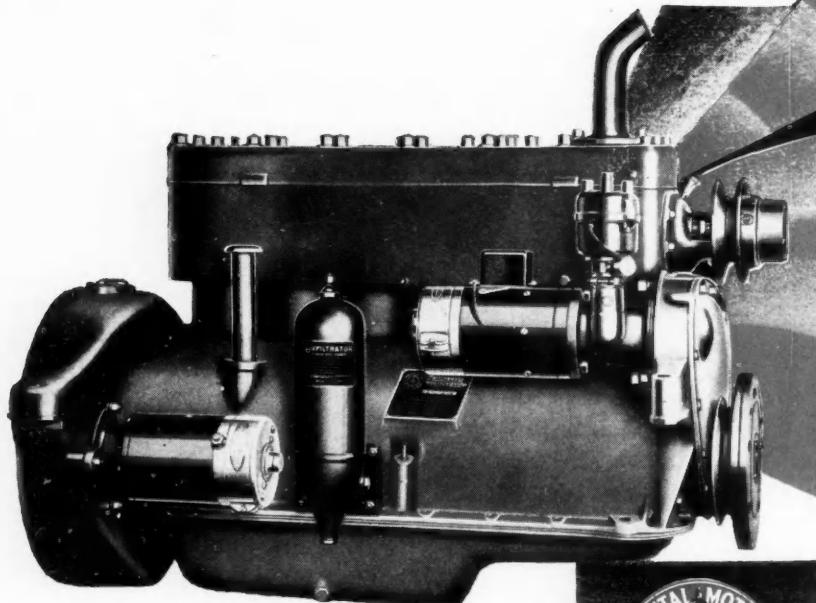
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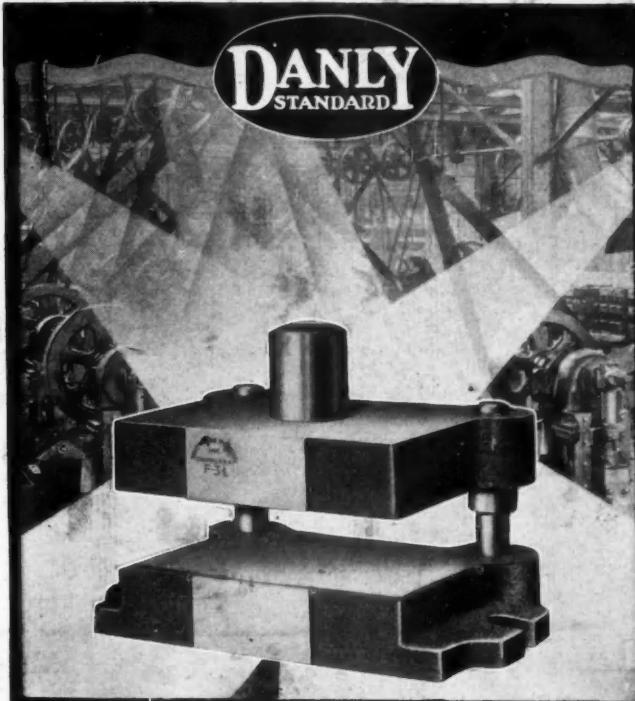
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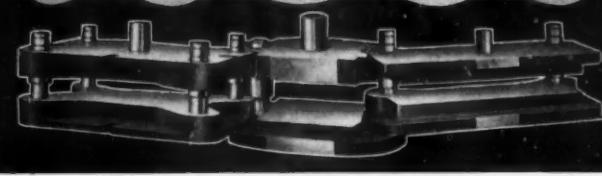
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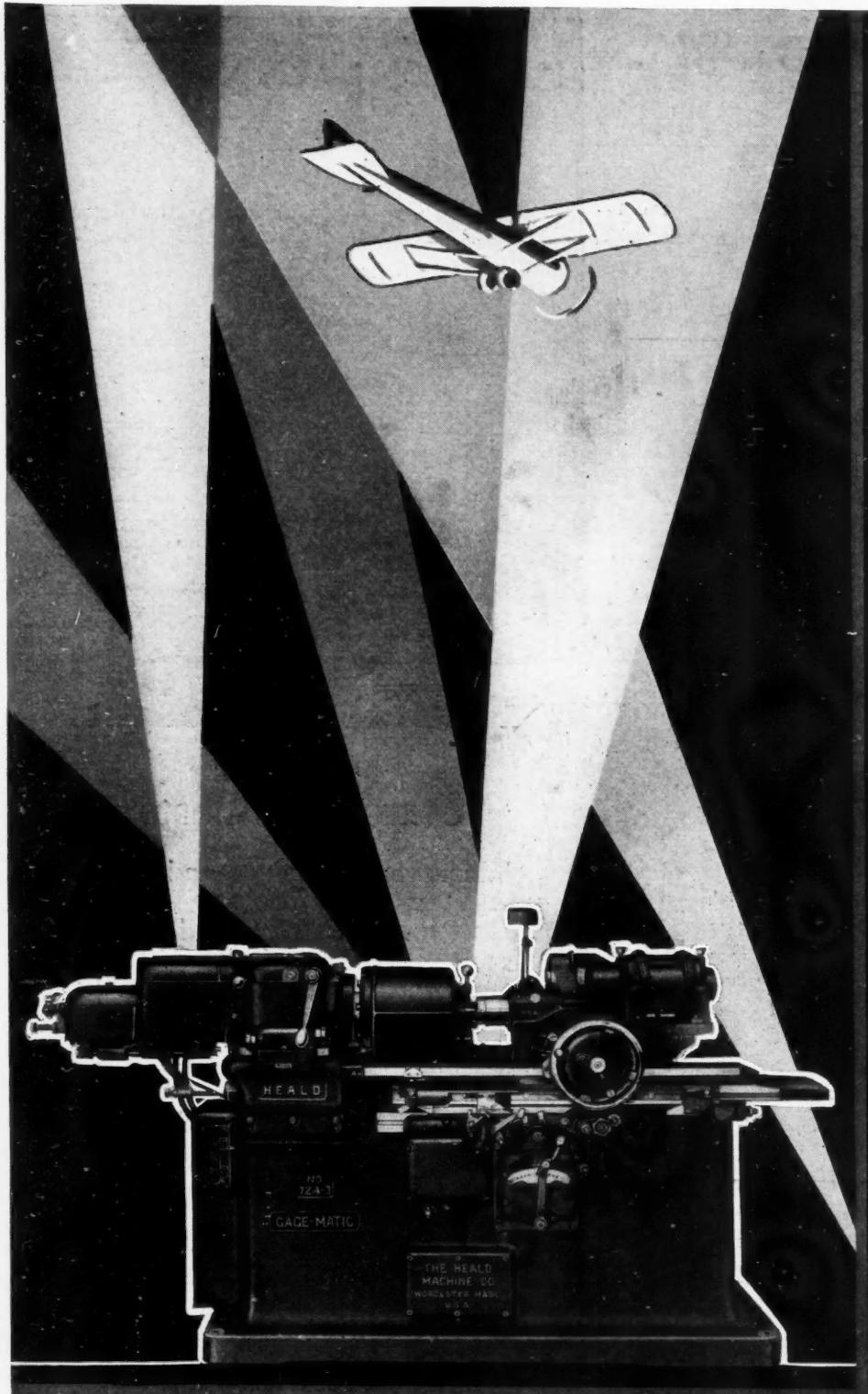
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July 13, 1929



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Georgia Debates Financing Methods For New Highways

Issue of \$100,000,000 in bonds, to be paid for entirely from automobile license and gasoline taxes, is opposed.

By NORMAN DAMON

Washington Office, National Automobile Chamber of Commerce



View of an unfinished "gap" in the State road north of Atlanta, Georgia

GEORGIA needs better roads.

Everyone is agreed on that point—not only the citizens of the state, but the thousands of tourists and Northern visitors who must drive through the state to reach Florida.

The difference of opinion among Georgians is with respect to the method—whether to continue on a “pay-as-you-go” basis or adopt the newer “pay-as-you-ride” plan.

A special committee on highway inquiry appointed by the Governor and headed by the present chairman of the State Highway Commission (prior to his appointment), aided by an able membership of bankers, legislators, and business men from all parts of the state, has just recommended a state highway bond issue of not to exceed \$100,000,000 to be paid for entirely from the motor tag and gasoline taxes.

The bonds would be used to repay the counties some \$25,000,000 advanced by them for state road building and to supplement available state funds.

Since the bond proposal would require a constitutional amendment, bills have been introduced in the legislature, which convened June 26, which would permit a referendum of the people at the next general election in the fall of 1930.

Due to the fact that an all-year program of construction can be followed, bond proponents are pointing to the first of 1931 as the beginning of a “speeding up” process in the improvement of the state highway system.

Opponents of the proposed state highway bond issue object to it on the grounds that it means the incurring of needless expense in interest charges when the state can continue on a “pay-as-you-go” basis, by simply increasing the gas tax one cent. This is claimed in the face of the fact that the state has been on a “pay-as-you-go” plan for 10 years and is today in worse financial condition with respect to its state highways than ever.

The attempt to justify a “pay-as-you-go” program in the production of a large mileage of roads in answer to the economic demand for roads has resulted in an unsound anticipation of revenues. Another result has been the withholding of Federal aid until order is restored in state highway finance.

Very few new contracts can be let during the present year, or until contracts let last year have been satisfied, and it is estimated that the state will enter 1930 about \$1,500,000 behind on these present contracts.

The present paved roads have been of limited value because of the gaps between them which are almost impassable at certain seasons of the year. The state is indebted to the counties for some \$25,000,000 advanced on state roads. High vehicle maintenance has prevailed, due to the large mileage of unimproved road that must be traveled. At the same time Georgia ranks fourth in the average of motor vehicle taxes.

The present state system is one of “gaps.”

There are but two paved roads across the

An Authoritative Statement

THE Georgia legislature, which convened June 26, has before it a proposal for a referendum on a \$100,000,000 state highway bond issue.

Recently at the request of the Georgian American and the Georgia Joint Committee for Highway Bonds, the National Automobile Chamber of Commerce sent Norman Damon, of the Chamber's Washington Office, to Georgia to study the state highway situation.

His article published herewith is an authoritative statement of conditions now existing. Whether the state will adopt the “pay-as-you-ride” policy, now successfully in force in many states, will be determined over the course of the next two months.

state—both of them in the eastern part and running north and south. Another running north and south across the western part of the state will shortly be completed. There are, however, no paved routes across the state from east to west.

This condition has necessarily been the outgrowth of the limited funds at the command of the state highway department, a condition inherent in the "pay-as-you-go" plan when followed at the outset of any major program of highway improvement. Added to these are the restrictions of the highway code under which the department has operated.

Excellent progress has been made on the bridge program, however, which is more than 80 per cent



Scene on a section of Georgia's highway system

completed. In addition, a large mileage of grading has been completed.

The State of Georgia has 97,000 miles of highways—more than any state east of the Mississippi. It ranks tenth in total highway mileage, twentieth in mileage in state systems, and twenty-first in surfaced mileage. This includes sand-clay, topsoil, and gravel. The present state system of 6400 miles—6 per cent of the total and practically coextensive with the Federal 7 per cent system—is about a quarter paved. The counties have contributed toward the construction of about a third of this mileage.

As a result of this county participation, the state owes them about \$25,000,000, which under the highway code is to be repaid when the state system is completed. As most of this money was secured from bond issues, many of the counties now find their credit about exhausted and their local roads still unimproved.

State Funds Limited

The state as a unit has contributed practically nothing toward the building of its own highways. Taxes on the motor vehicle have accounted for about half the available funds, while Federal aid and county funds have provided most of the balance.

The state highway department has been operating under a highway code whereby the available funds must be apportioned equally among the twelve congressional districts.

Further, under the law providing for county participation in main road improvement the wealthier counties have been able to provide funds to match the state money and, as a result, have built roads on the state system. Where the poorer counties occur the state roads are unimproved, resulting in the "gaps" or "patch-work" referred to. The fact that there are 162 counties in the state has added measurably to the difficulties of administration and contributed to this "patch-work" system of improvement.

Georgia ranks last in motor vehicles registered

per person, while it stands twelfth in population, twentieth in area and twenty-fifth in wealth. It should be noted that the Negro population is about 40 per cent of the total, exceeded only by Alabama and Mississippi. Many of the Southern States have a third or more Negro population.

The gasoline tax rate is now four cents per gallon, of which two and one-half cents is available for state roads, one cent goes to the counties, and one-half cent to the state school fund. In the early years of imposition of this tax it was used to pay discounts on Western and Atlantic railroad rentals.

It is not the anticipation of the sponsors of the bond plan either that the whole \$100,000,000 in state bonds, if authorized, would be sold at once, but rather that up to \$10,000,000 a year would be used to supplement the state road construction fund and the counties would be repaid over a five or 10-year period.

The bugaboo of the debt of reconstruction days is held up by highway bond opponents, despite the fact that the road user is to pay for the highway bonds which will benefit general property tremendously, without any property tax payments whatever.

Users Want Bonds

In the effort to ride on roads as they pay for them, the motor vehicle users of the state have united with the county commissioners, Kiwanis Clubs and other civic organizations in the Georgia Joint Committee for Highway Bonds, which is leading the fight, to have the state embark upon the maximum economical state road construction program. Since they are paying in taxes an average which ranks fourth for the country, there are but few states where they are more justified in demanding roads.

The action of the legislature during the two months of its life will determine whether the people of the state will have the chance to vote on the bond proposal. If they get that chance, judging by the experience of the road user in other states, there will



Another view of the State road near Atlanta

be but one answer, and that affirmative. Like his brethren in other states, the user prefers to "pay-as-he-rides," rather than "pay-as-he-goes."

One thing is certain—the motor vehicle owner will continue to pay just as much taxes whether he gets the roads via the bond route or otherwise. Hence the justification of his demand to have the roads now.

Add to this the economic stimulation and favorable national advertising that would result from Georgia serving notice that she plans to improve her main roads immediately; figure in the savings in vehicle and road maintenance and the repayment of the debt to the counties, and you have the case for bonds in the judgment of the Joint Committee.

Efficient Combustion in Oil Engines Is Controlled by Five Factors

All are so dependent upon one another that an improvement in one often adversely affects the other groups, resulting in the net reduction of performance.

By WILLIAM F. JOACHIM

Sr. Mech. Engr., Westinghouse Electric & Mfg. Co. Machine Works

THE progressive development of Diesel engines, from the standpoint of combustion control and improvement, has resulted in many different engine designs and methods of controlling combustion. Thus, Diesel and oil engines are constructed to operate with an air blast for injection of the fuel, with hydraulic pressure injection of the fuel, with integral combustion chambers, with precombustion chambers, and with low, moderate, or high turbulence of the combustion air.

All engine types, each comprising some combination of these major methods of combustion control, have been further sub-divided by their designers as to the shapes of the combustion chambers employed, types of mechanisms used for injection, and various devices designed for controlling combustion. The obvious reason for the many changes in cylinder heads and pistons, methods of fuel injection, and the almost multitudinous detail design features of fuel pumps and atomizers, is, of course, the fact that the previous designs were not adaptable for service at higher rotative speeds or did not give the combustion performance of which the Diesel cycle is theoretically capable. Further, this situation continues and is accentuated in high-speed oil engines, in most instances, because of the lack of sufficient understanding of the effects of cylinder design, of the hydraulic phenomena involved in the processes of injection, and of the physical characteristics of fuel oils and oil sprays, and of their ignition and combustion.

If the different types of engines are classed as either Diesel engines, i. e. air injection engines, or oil engines, i. e. hydraulic pressure injection engines, we find an appropriate equal division between air and hydraulic injection for the slow-speed engines, but for the high-speed engines we find a very definite trend toward the hydraulic pressure injection principle.

Among the Diesel engines employing non- or low-turbulence type combustion chambers are the M.A.N., Krupp, Tosi, McIntosh and Seymour, Worthington, Sulzer, Junkers, and the high-speed Maybach engines. Among those employing moderate or high-turbulence type combustion chambers are the

Nordberg-Carels and the Nelseco Diesel engines. As a type, Diesel engines have good combustion characteristics, but they are slow-speed engines (except for the Maybach, which has operated at speeds around 1300 r.p.m.), are heavily constructed, and are generally not well suited for continuous transportation service at high speed because of their weight and complication.

Those engines employing hydraulic pressure injection, the oil engines, and non- or low-turbulence type combustion chambers are represented by the Vickers-McKechnie, M.A.N., Beardmore, Bessemer, Treiber, Dorner, Packard, British Air Ministry experimental, American N.A.C.A. experimental, and Westinghouse engines. In this list, one recognizes several oil engines that operate at speeds ranging from 700 to over 2000 r.p.m. Thus, the Beardmore, British Air Ministry and Westinghouse engines operate with creditable combustion performance at speeds from 700 to 1000 r.p.m., the Packard aircraft engine at 1900 r.p.m., and the American N.A.C.A. engines at speeds from 800 to over 2000 r.p.m.

Those oil engines employing moderate or high-turbulence type combustion chambers comprise a list of even greater length. They are represented by the Ruston-Hornsby, Ingersoll-Rand, Falk, Doxford, A.E.G., Junkers, Peugeot-Tartrais, Brotherhood-Ricardo, Cummins, American N.A.C.A. and Westinghouse engines. Of these oil engines, the Junkers-Brotherhood-Ricardo, Cummins, N.A.C.A., and Westinghouse engines operate with good combustion performance around 800 r.p.m.

There is only one high-speed Diesel (air injection) engine, the Maybach, while there are ten high-speed oil (hydraulic pressure injection) engines noted in this comparison. Of the more successful oil engines, the greater number employ some form of moderate or

high-turbulence combustion chambers. This tendency toward combustion air turbulence is, of course, the natural result of the efforts of designers to replace the excellent fuel and air mixing characteristics of the injection air blast in Diesel engines with inlet valve or piston controlled air turbulence in oil engines.

THIS article, and one to be published in AUTOMOTIVE INDUSTRIES of July 20, present, in a slightly summarized form, the paper read by Mr. Joachim at the Penn State Oil Power Conference and A.S.M.E. Gas Power Meeting, held at State College, Pa., from June 24 to 27, 1929.

In this connection, the total energy in the blast air and injected oil particles in Diesel engines can be equalled in oil engines by the use of hydraulic injection pressures between 17,000 and 20,000 lb. per sq. in., by piston controlled air turbulence, or by a suitable combination of relatively high injection pressures, inlet valve and piston controlled combustion air turbulence. It may be stated, however, that the increase of fuel spray energies alone in oil engines to or above the combined energies of the blast air and injected oil particles in Diesel engines does not insure equal performance in oil engines, as will be discussed later.

The published theoretical work on oil engines is still far behind that on steam engines and turbines. The works of W. J. Walker, Goodenough and Baker, Neumann and Ellenwood, Evans and Chwang on the efficiencies of oil engine cycles are worthy of study by oil engine engineers. These theoretical data are incomplete, however, as regards the consideration of many engine and combustion factors that affect the calculated efficiencies. Foremost among these factors are the specific heats of the several gases of combustion, which vary considerably with the large changes in temperature met in engine work but which have been assumed to remain constant or have not been fully considered in the theoretical work. Analyses were accordingly undertaken, in 1926 and 1927 at the Langley Memorial Aeronautical Laboratory of the N.A.C.A., of complete oil engine cycles and of the variation of specific heats with pressure and temperature, particularly as given by Pier, Holborn and Henning, Bjerrum, Goodenough and Felbeck and Partington and Schilling, and of their accurate application to oil engine cycle efficiency calculations. This work when completed will establish the most desirable operating values of maximum cylinder pressures and compression ratios for specific engine services and provide methods for making more accurate determinations of the degrees of perfection of the combustion processes in oil engines.

Research Work Started

The Engineering Experiment Station of the Pennsylvania State College has developed apparatus for the measurement of many important characteristics of oil sprays and is entering on an extensive research program.

The fundamental work of the N.A.C.A. staff on the development of fuel sprays for the several major variables of hydraulic pressure injection, now widely circulated, has aided in the design of commercial engines and in the analyses of experimental data. The extension of the present N.A.C.A. photographic apparatus, undertaken in 1926, to permit studies of the effects of

air temperature and turbulence on the penetration, ignition, and combustion of fuel sprays should enable further advances to be made.

The published experimental data dealing with combustion consists largely, at present, of several papers on the ignition temperatures and combustion reactions of fuels, and on the effects of various fuel spray characteristics and engine design and operating factors on combustion in slow and high-speed oil engines.

The most recent authoritative work on ignition is that of Tausz and Schulte, who have discussed the complicated combustion reactions in Diesel engines and published considerable data on the temperatures of auto-

ignition of fuels and fuel mixtures as affected by the pressure of the air into which they were either dropped or sprayed as in an engine. A paper on the combustion of liquid fuels by Otto Alt and a discussion of the ignition and combustion phenomena in Diesel engines by F. Sass, supplement the earlier works of Dixon (1884-1925), Bone and Wheeler (1902-1903), Holm (1918), Moore (1918-1927), Hoffmann and Freyer (1920), Wollers and Ehmke (1921)

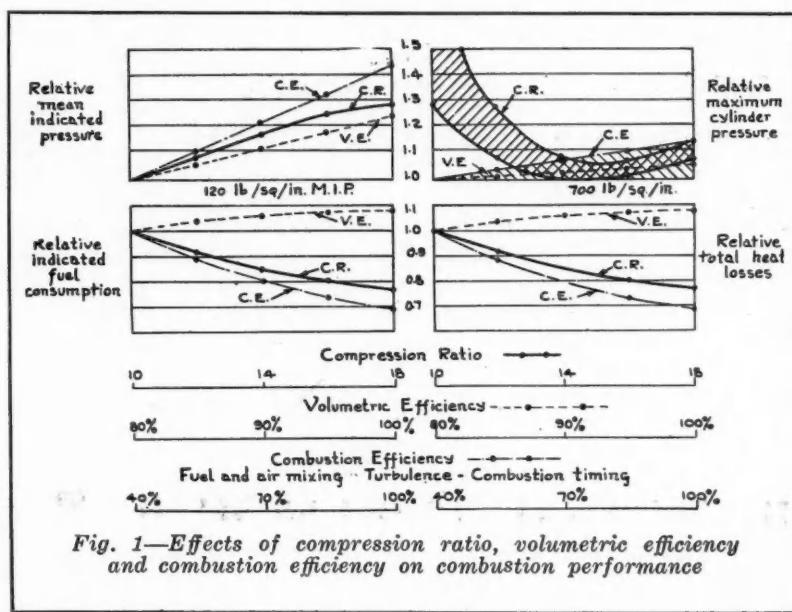


Fig. 1—Effects of compression ratio, volumetric efficiency and combustion efficiency on combustion performance

and Von Wartenburg and Sieg (1921-1924).

Various phases of combustion in slow-speed engines, as affected by injection nozzle, fuel cam, piston, and cylinder design have been discussed by Hawkes, Basu, Nicholson, and Keller. The general subject of oil engines for vehicles, with theoretical analyses, engine descriptions and performance data have been published in separate papers by Hausfelder and Neumann.

Technical Reports Completed

The work of the British Air Ministry on relatively large cylinders for high-speed engines has been published in separate papers by Pye and Taylor, and the researches of the American National Advisory Committee for Aeronautics on aircraft type oil engines are published by the government as technical reports following their completion.

The purpose of the present paper, thus far, has been to indicate the trend of combustion control as represented by the growth of Diesel versus oil engines, and to mention the more complete works (for reference) on oil engine thermodynamics, on fundamental investigations of oil sprays, ignition temperatures and combustion reactions, and on analyses of combustion experiments in slow and high-speed oil engines. The several major factors that affect combustion have been investigated and coordinated in the following paragraphs together with analyses of oil spray formation, vaporization, ignition and combustion, and certain turbulence requirements in high-speed oil engines.

There are five major groups of factors that control combustion in oil engines. These are: (1) engine

factors; (2) injection pump factors; (3) atomizer or injection valve factors; (4) fuel factors, and (5) oil spray distribution factors. Each of these five groups consists of many controlling individual factors and is closely related in its effects on combustion to the four remaining groups. No individual factor in one group may be altered in any respect without affecting to a greater or lesser degree several, perhaps many factors in the same and other groups. Observation of the performance of various engines shows that an improvement in one individual factor often so adversely affects certain controlling factors in other groups as to result in a net reduction in combustion performance. While each major group is of different ultimate importance in obtaining good combustion, all groups must be properly balanced and correlated for best performance.

Study of Parts Design

In the ordinary course of engine design, after the general class of engine has been determined, consideration is given to the type of engine to be constructed and to a mass of engine details. These details have to do with engine power; speed; cylinder size, arrangement and number; gas and inertia forces; stresses; materials; lubrication; cooling; fuel handling, and with a number of accessories. Not until the relatively recent crusade for greater power and economy in carburetor engines and a parallel movement for higher rotative speeds in oil engines, has much study been given to the detail design of those parts that control combustion.

While there are a large number of engine combustion factors to be considered in designing for high speed, such as compression ratio, exhaust and induction efficiencies which combine to establish the volumetric efficiency, combustion chamber shape, turbulence of the combustion air, ratio of total mean cylinder wall area to mean cylinder volume, combustion chamber hot-spots, engine operating temperatures, and location of valves, only those having the greatest effects on combustion have been plotted for brief discussion.

Figure 1 shows the approximate relative improvements in combustion performance to be effected by increasing the compression ratio, volumetric efficiency, and combustion efficiency. Combustion efficiency is used in this paper as relative efficiency, or the degree of combustion perfection actually obtained expressed in per cent of that theoretically obtainable for the conditions of operation. It is included among the engine factors because of the important effects of cylinder and piston design on combustion chamber shape, hot-spots, heat losses, adaptability to the selected oil sprays, combustion air turbulence and other factors. The data of these improvements were obtained from many engine tests,

published thermodynamic theory, and work recently completed at the Westinghouse Electric & Manufacturing Company.

Less Expansion Obtained

It should be noted that increases in all three engine factors increase the mean indicated pressure, but only the compression ratio and combustion efficiency decrease the fuel consumption and relative total heat losses. In this case, increasing the volumetric efficiency while maintaining or only slightly increasing the maximum cylinder pressures (all other factors remaining constant, particularly the air-fuel ratio and combustion efficiency), increases the amount of constant pressure combustion. A lesser degree of expansion of the additional fuel and air is therefore obtained and this increases the fuel consumption and the total heat losses.

A second case not plotted may exist, in which the volumetric efficiency is increased but the amount of fuel burned per cycle is maintained constant. For this condition the air-fuel ratio is increased somewhat faster than the volumetric efficiency. If the relative but ever-changing space distribution of the injected oil particles throughout the combustion chamber can be maintained, the combustion efficiency will be increased, i.e., m.i.p. increased and fuel consumption decreased, because of the greater amount of oxygen immediately available for each oil particle and therefore the probability of more complete combustion and decrease of after burning in the brief time available.

The improved combustion performance to be realized by increasing the compression ratio, Figure 1, obtained from work by Goodenough and Baker, is for constant volumetric efficiency, constant fuel quantity injected per cycle (excess air, approximately 110 per cent), and constant relative combustion efficiency. The theoretical increase of 28 per cent in m.i.p. to be obtained by increasing the compression ratio from

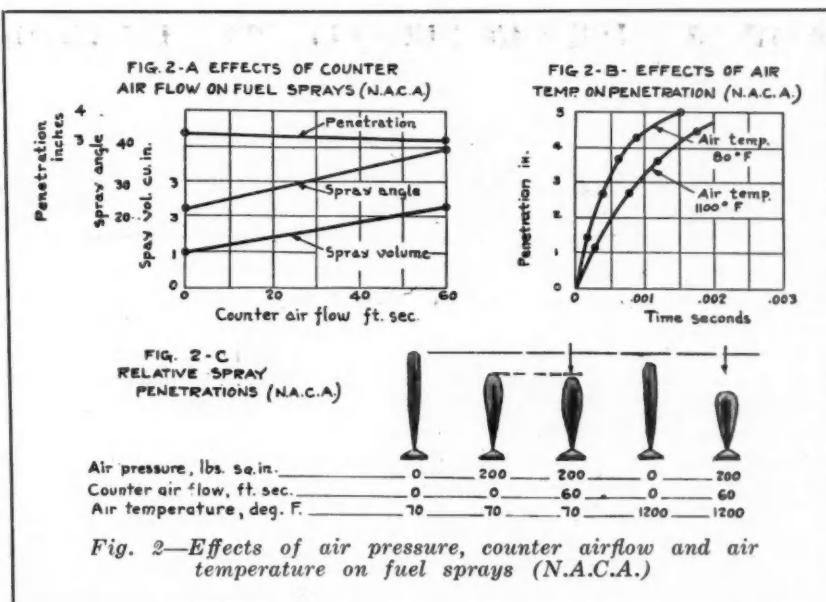


Fig. 2—Effects of air pressure, counter airflow and air temperature on fuel sprays (N.A.C.A.)

10 to 18 is often most difficult to realize in practice. The variation of this engine factor alone, in experimental work, seriously affects other factors, as previously discussed, affecting in this case, the combustion chamber shape, average combustion air densities and temperatures, location and movement of the combustion air masses, and several other controlling factors. The expected performance increase will not be obtained, therefore, unless the timing and detail processes of injection, including certain characteristics of the oil sprays produced, are completely re-coordinated to the new conditions.

The improved performance to be realized by increasing the combustion efficiency, Figure 1, is derived from

work by Goodenough and Baker, for constant volumetric efficiency, constant theoretical full load fuel charge, and a compression ratio of 12. The relative combustion efficiency for 120 pounds per square inch m.i.p. of approximately 40 per cent, based on the ratio of fuel and air actually burned to that available for combustion in the cylinder is taken as the average, low-combustion performance. In this case, the theoretical air in the cylinder, based on the air required for the fuel actually burned, is 238 per cent and the excess air is 138 per cent.

As the degree of perfection with which all of the processes of combustion are carried out is increased, greater percentages of fuel and air are completely burned until, at 100 per cent combustion efficiency, approximately 172 lb. m.i.p. will be obtained. For these conditions the fuel consumptions and total heat losses decreased in inverse ratios as shown in Figure 1.

The usual case met in practice, involving a consideration of combustion efficiency increase, is that in which the quantity of fuel injected in each cycle gives as much power as can be practically obtained with approximately the lowest brake fuel consumption. Better methods of combustion control in these cases permit proportionally greater fuel quantities to be injected per cycle to obtain greater power for the same order of relatively low fuel consumption.

The effects of volumetric and combustion efficiencies on the explosion pressure are not necessarily great and have been assumed to be controlled for these comparisons at a practically constant value. Considerable experience indicates, however, that it is particularly difficult to operate an oil engine at high speed with a low compression ratio and maintain low explosion pressures largely because of increased ignition lag. The ignition lag is much shorter, however, for higher compression ratios and aids considerably in obtaining good combustion performance with explosion pressures between 700 and 800 pounds per square inch.

Engine Turbulence and Temperature

Figure 2 shows some of the effects of counter air flow and air temperature on fuel sprays for oil engines. These were obtained by making special attachments for the N.A.C.A. fuel spray photography apparatus and taking successive pictures of the spray as it developed under each set of conditions at the rate of 2000 to 4000 pictures per second. It may be noted in Figure 2a that, contrary to the usual belief, counter air flow or air turbulence did not have an appreciable effect on the penetration of the spray, but did increase the spray cone angle and volume.

The effects of high air temperature, 1100°F., shown in Figure 2b, on Diesel oil injected into air at atmospheric pressure was to produce an apparent decrease in penetration from that obtained by injecting into air at 80°F. In this case, the fuel vaporized by the hot air was not photographed so that the plot is reproduced for the visible spray only. A summary of these engine effects, air movement and temperature, on fuel sprays is given in Figure 2c.

Combustion Chambers

Six essentially different types of combustion chamber design are shown in Figure 3. An examination of these combustion chambers shows that there has been as yet no standardization of shape, ratio of wall area to volume, arrangement of valves, or combustion air turbulence.

Thus, the Beardmore and Westinghouse combustion chambers, Figure 3a, are practically thin disks having a thinner center than edge, due to the conical shape of the piston crown. They have a small wall area to volume ratio, and create practically no piston controlled turbulence of the combustion air. Several fuel sprays are directed radially downward at a small angle from an atomizer located centrally in the cylinder head.

In contrast to this type of combustion chamber, which has been in service on rail cars and locomotives over a considerable period, is the Brotherhood-Ricardo combustion chamber, Figure 3c. This combination chamber is built in the cylinder head and is cylindrical with a somewhat greater height than diameter. Its diameter is also less than that of the cylinder so that the piston on reaching top center displaces the air in the annulus between the cylinder wall and the combustion chamber radially inward to produce piston controlled air turbulence. This engine admits the working gases through a single sleeve valve which causes the incoming air to swirl in the cylinder and so adds a second type of air turbulence. The combination of these two air movements produces a torus of twisting air in the combustion chamber which rotates at the same time around the cylinder axis. Only one oil spray, injected in approximately 10° of crank-shaft rotation near the edge of the combustion chamber, is used.

The Junkers two cycle engine combustion chamber, Fig. 3f, is similar in design to that of the Beardmore and Westinghouse combustion chambers, since both are essentially flat disks in shape. The relative motions of the two pistons and the swirling air in the Junkers cylinder, however, produce more turbulence in the combustion air. The Westinghouse two-cycle engine com-

(Continued on page 61)

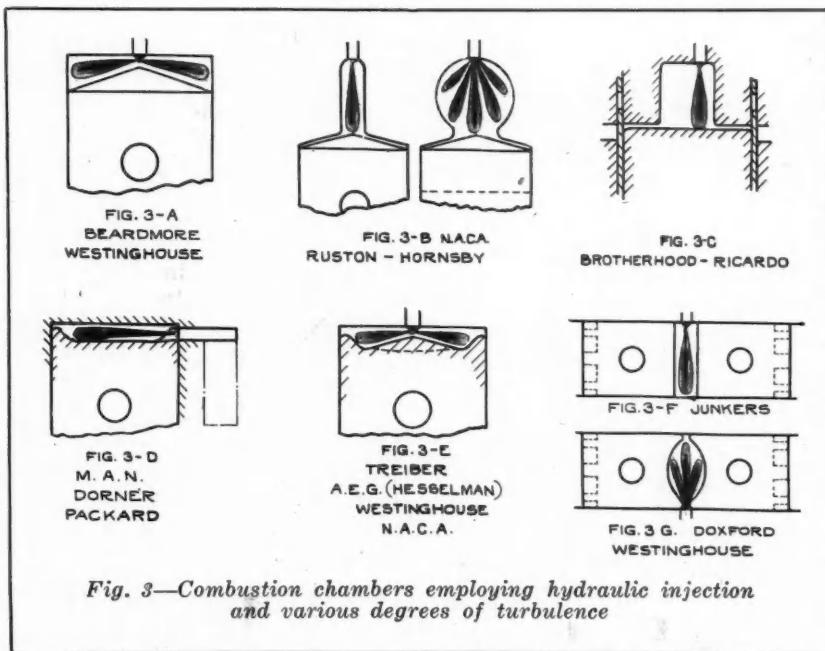


Fig. 3—Combustion chambers employing hydraulic injection and various degrees of turbulence

Exhaust Driven Turbo-Supercharger Passes Extensive Tests in Germany

Blades are internally air-cooled with full area gas impact at comparatively low pressure. Silencing effect of turbine eliminates need of muffler.

By EDWIN P. A. HEINZE

A NEW supercharger of the exhaust turbine-driven type has been given extensive tests in Germany recently with unusually successful results. It is the invention of C. Lorenzen, an aircraft engineer, who, during the war, had charge of the government experimental station for the development of air engines for altitude flying. The idea of such a supercharger was first conceived by Mr. Lorenzen as far back as 1916, since which time he has constantly improved upon it.

The Lorenzen supercharger is of the centrifugal exhaust-driven type, and its principle of operation will be understood by reference to Fig. 1. In the drawing, *A* represents the hub of the rotor, which is provided with an annular series of turbine blades *B* at its circumference. These blades consist of short pieces of seamless steel tubing that are pressed into a sickle-shaped section, with rectangular openings at the ends.

These blades are so fitted into the rotor that they offer no obstruction to passage of air between them in the radial direction. Air enters the radial passages *C* in the rotor at the sides near the hub, and is subjected to great centrifugal force by the speed imparted to it by the rotor, whereby it is ejected into the annular diffusing chamber *E*, from which it is led to the carburetor through the pipe indicated by *F*. The rotor is driven by the exhaust gases from the engine, and in the diagram these gases are shown to be directed laterally against the blades by the two nozzles *D*. In the latest supercharger these nozzles have been dispensed with, as will be explained later.

The main feature of the design is the method of internal cooling of the turbine blades. The heat from the exhaust gases passing through the turbine blades laterally, is taken up by the air passing between them radially, and experience has shown that there is absolutely no detrimental effect of the heat on the turbine blades. Preheating of the air improves the vaporization

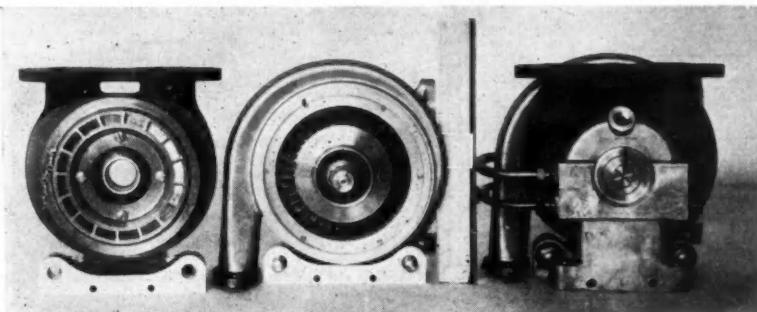
of the fuel and the loss in volumetric efficiency is more than made up by the increase in the charging pressure.

Several superchargers working on this general principle, but modified in details, have been built and tested. One was subjected to long and severe tests by the German aeronautical testing station on a 300-hp. Hispano-Suiza engine in 1926. In that case the exhaust gases entered the turbine at a temperature of 1200 deg. Fahr. and escaped from it at 750 deg. Fahr. The maximum turbine speed was 30,000 r.p.m. and, in a test carried through to determine the maximum safe speed of the turbine, it was brought up to 50,000 r.p.m., which meant a centrifugal load of 1322 lb. on each blade.

During these tests one of the pistons of the engine broke and a piece of it was thrown into the turbine. It grated the blades and indented those on one side but caused no other damage to the turbine.

At speeds of 10,000 to 25,000 r.p.m. the turbine transformed from 12 to 16 per cent of the energy contained in the exhaust gases into effective work, in spite of considerable losses owing to air leakage. It also was found that the turbine produced a very pronounced muffling effect without setting up excessive back pressure, the latter not even reaching 7 lb. p. sq. in. Since these results were obtained the turbine has been further improved.

Real practical experience, however, has been gained with the Lorenzen turbo-supercharger on an old Mercedes car with a 40 hp. four-cylinder engine, that previously was fitted with a Roots type of supercharger. The car was run with the new supercharger for two years and gave entire satisfaction. The rotor consists of two steel disks, which between their correspondingly indented rims hold the base of the blades. As already mentioned, the disks have holes at the sides to admit air, which enters the rotor from both sides through annular chambers in the casing. The shaft runs on



Three views of the latest supercharger. The one on the left shows the inlet for exhaust gases on top and the exhaust directing blades in the foreground. In the view in the center the exhaust diffuser has been removed and the rotor is visible, while the connection at the lower left is the air outlet. The view on the right shows the complete supercharger. The lower of the two small tubes passing around the air volute, which is an oil tube, has now been done away with

ball bearings in the casing. Former models were provided with pressure lubrication, but this has been found to be unnecessary and is not used in the latest model. On the shaft midway between the two sides of the rotor is a distributor disk with straight radial vanes on its sides, which conduct the fresh air drawn in through the holes, to the internal opening of the blades. A sufficient supply of fresh air is ensured by a small fan on each side of the distributor disk, mounted together with it on the shaft.

Built for Automobiles

A section through this turbo-supercharger is shown in Fig. 1 in the form in which it is being built for automobiles. It has a diameter of 9 in. and a length of 6 in., and it can be used for engines up to 100 hp. The rotor consists of the two disks *A* holding the blades *B*. The exhaust gas enters the turbine at *C* and passes into the annular chamber *D*. Between this chamber and the ring of rotor blades there is a stationary ring with a large number of guiding blades which give the gas current a definite direction and virtually act as so many nozzles. This is a very important feature, as it ensures that the whole rotor blade area is subjected to a comparatively low and uniform gas pressure, whereas in other turbo-superchargers the gas is directed against the blades at certain places of limited area by special nozzles. These latter require the gas to have a much higher pressure and therefore cause corresponding back pressure.

The gas passes through the blades to another annular

chamber *E* and thence through a large and long port into the atmosphere. As the turbine has a very pronounced silencing effect, no muffler is required.

The fresh air for the engine, which also cools the blades, enters the casing through the two large ports at the top, passes through the fans *G* and is then directed by the distributing disk *F* with its radial vanes to the base of the blades, through which it then passes on to the diffusing chamber *H*. From here, it is conducted by a suitable pipe to the carburetor. To prevent leakage of air from the diffusing chamber into the ex-

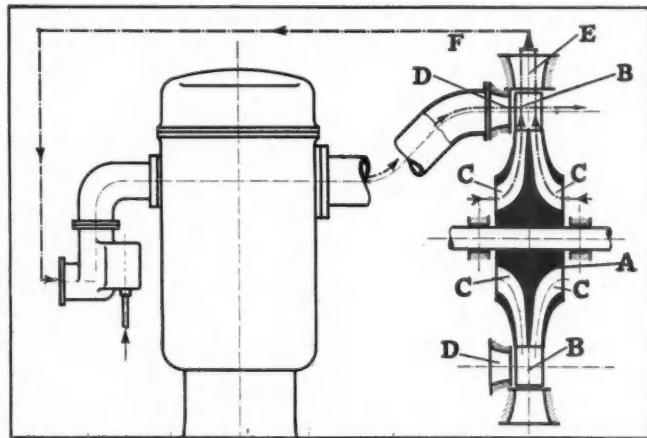


Fig. 1—Diagrammatic section through centrifugal supercharger and representation of its connection to the engine

haust gas chambers a labyrinth packing *I* is provided along the edges of the ring of blades, which latter, by the way, are welded at their top adjacent edges, while their bases are soldered on.

The two ball bearings, which are provided with caps to keep the lubricant in, are provided each with a small water jacket. When the supercharger stops the air-cooling effect ceases, and the heat from the red-hot blades then flows to all parts, including the shafts and bearings. If the bearings were not water-cooled the heat would cause the oil to run off them, while with a water-cooled bearing the heat is absorbed by the water.

Blade Construction Difficulties

The chief advantages claimed for the Lorenzen supercharger are the internal air-cooling of the blades (hitherto a most difficult problem), the full-area gas impact on the blades at comparatively low pressure, the low back pressure on the engine and the self-contained, simple design. The greatest difficulty with which the inventor was faced was in connection with the construction of the blades. These were first formed of very tough sheet steel, which was stamped, pressed and joined. But this method soon proved impracticable and tubes of a self-hardening steel made by the Bismarck Huette were adopted, they being pressed into the shape mentioned, after which a base rim is soldered on. An improvement respecting this base rim has been evolved quite recently, which leads to a considerable simplification of the manufacturing process, but regarding this no information is available as yet.

Lorenzen also has built a large turbine on this principle, driven by hot gases produced in a special burner, and believes his invention has brought near the realization of an age-old dream—the gas turbine. This gas turbine is only about 2½ ft. in diameter and is claimed to develop at least 100 hp.

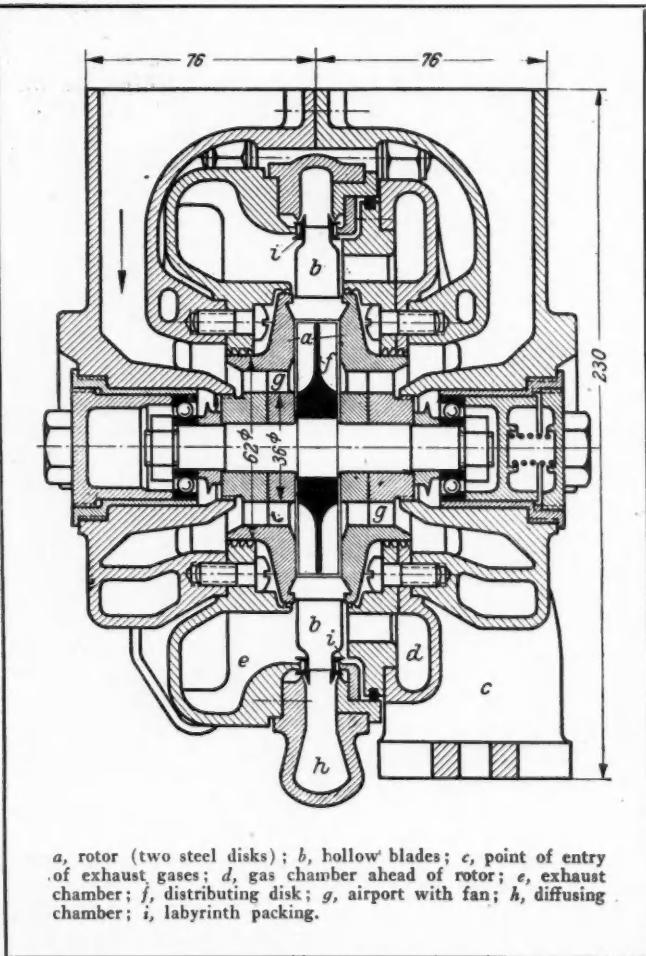


Fig. 2—Sectional view of latest Lorenzen supercharger. (Courtesy of V.D.I.)

Gas-Electric Drive Delivery Car Offered by Thorne Motor Co.

The vehicle, designed for house-to-house work, is powered by a four-cylinder Continental engine with 70-volt General Electric generator and motor

A GAS-ELECTRIC commercial vehicle for house-to-house delivery has been placed on the market by the Thorne Motor Co., 3231 W. Lake St., Chicago. It has a wheelbase of 98 in. and is provided with a panel body that is designed to carry either 40 qt. crates or two to three butter boxes, with space for ice in summer, the maximum pay-load capacity being 3000 lb. The chassis with body weighs 4000 lb.

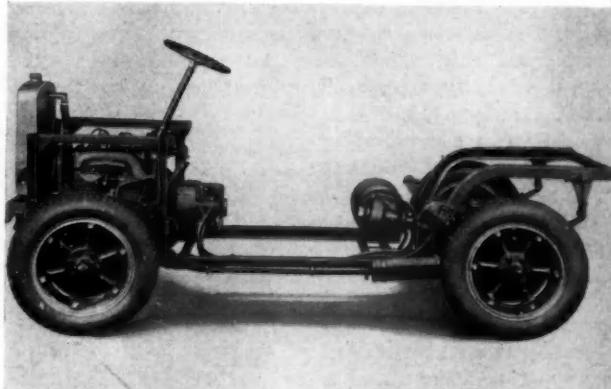
A low floor height of 11 in. is made possible by carrying all chassis units in two assemblies over the front and rear axles and dropping the frame amidships. Entrance for driving or to the interior of the body is through either of two side doors. A reversing switch is located on the dash and has three positions—forward, reverse and neutral. Another switch on the dash cuts in an additional weak field circuit for hard pulls. The engine is provided with a governor. A foot switch permits of rapid acceleration. The throttle is located on the steering gear.

The front end assembly includes the radiator, steering gear, engine and generator mounted in a channel-iron cradle as a unit over a drop forged I-beam front axle. The rear-end assembly comprises the motor and rear axle. The construction is such as to permit easy access for inspection and repairs.

The engine, a 3 $\frac{3}{8}$ by 4 $\frac{1}{4}$ -in. four-cylinder Continental, is mounted integral with a General Electric 70-volt generator. The Wheeler & Schebler carburetor is fitted with an air cleaner. Starting, lighting and ignition equipment is of Auto-Lite manufacture, while the 6-volt battery is an Exide. A 3-in. core, two-finned type radiator is mounted on the front cross-member of the frame. The exhaust is carried through a flexible and straight tube suspended outside and below the left side rail to a muf-

fler supported by a bracket at a point below the rear spring front bracket.

Cables carried inside the left side rail carry the current to a General Electric 70-volt motor, which is mounted on the right side of cross-members secured to the frame side rails at a point immediately in front of the kick-up over the rear axle. The motor is mounted cross-wise of the frame, but is di-



View of chassis of the Thorne gas-electric delivery car, showing method of mounting engine and motor

rectly connected to the rear axle through gearing in the ratio of 2 1/3 to 1, two metal universals and a short shaft. Final drive is through a spiral bevel, semi-floating axle giving a final reduction of 5.1 to 1. Thus, the overall reduction is 11.9 to 1.

The 3 x 1 $\frac{1}{2}$ x 3 $\frac{1}{16}$ -in. pressed steel frame, reinforced by heavy cross-members and gusset plates, is suspended on four 10-leaf semi-elliptic vanadium steel springs, 2 x 37 in. in front and 2 x 36 in. in the rear.

Front springs are shackled at the front and pin-jointed at the rear, the rear brackets being riveted to the rear uprights of the cradle. Rear springs are pin-jointed at the front and shackled at the rear.

Chassis lubrication is by the Alemite system, and the steering gear is a Ross cam-and-lever design. Lockheed internal hydraulic four-wheel brakes act on 15 by 2 in. drums, and an external brake acting on a drum on the motor shaft serves as parking brake. Steel wheels equipped with 30 by 5 in. pneumatic tires are standard. In addition to head, tail and dash lamps the equipment includes a large electric dome light inside the body. The standard equipment includes an oil gage, ammeter, electric horn, spare rim, tire carrier, etc.

Body panels are made of Ply-Metal. The body has an inside width of 60 in., a height from the floor of 72 in., a height over the rear axle of 48 in.



Gas-electric drive commercial vehicle, designed for house-to-house delivery, announced by Thorne Motor Co.

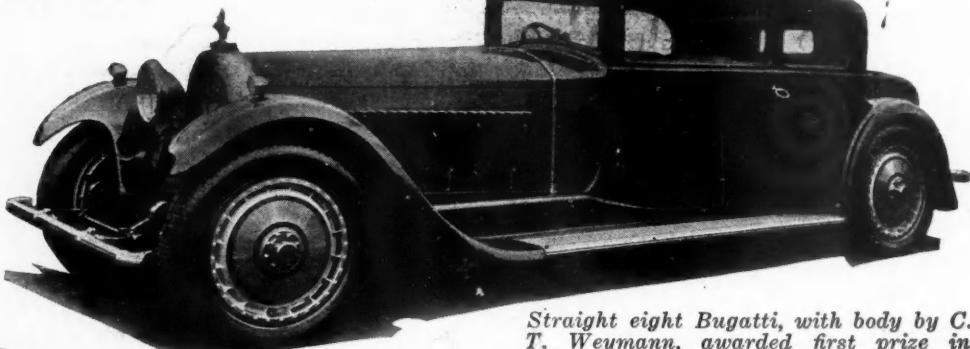
French Award Won by Bugatti In Annual Body Competition

[Prize car was a five-passenger coach built by Weymann on a straight eight chassis.]

By W. F. BRADLEY

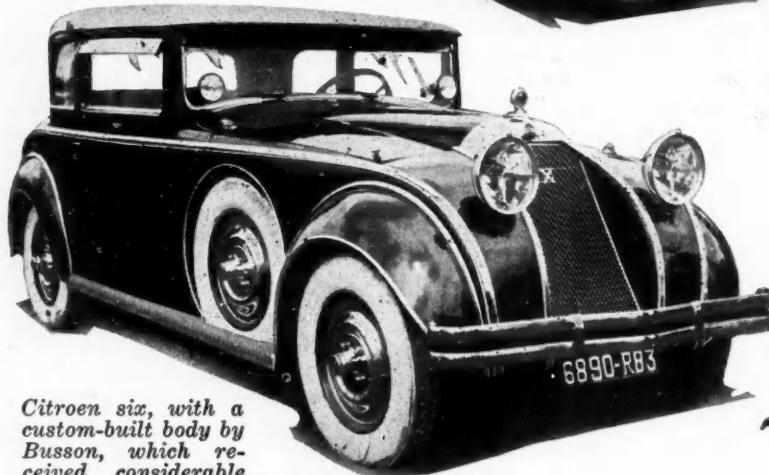
FIRST prize in the annual French body competition was won by a straight eight Bugatti carrying a custom body built by Weymann and valued at \$24,000. The contest, held in Parc au Princes, near Paris, early this month, had many unusual displays of body design.

The winning chassis is the first of a series being built by Bugatti and is powered by a straight eight engine of 854 cu. in. piston displacement. Among the features of the engine are three valves per cylinder operated by an overhead camshaft, nine water-cooled crankshaft bearings, and a



Rear view of the 200 hp. Bugatti, first prize winner at the French contest for body designs. The vane-type spokes in the wheels are a feature

Straight eight Bugatti, with body by C. T. Weymann, awarded first prize in French appearance contest for automobiles held in Paris recently. The body as illustrated is custom-built and is valued at \$24,000



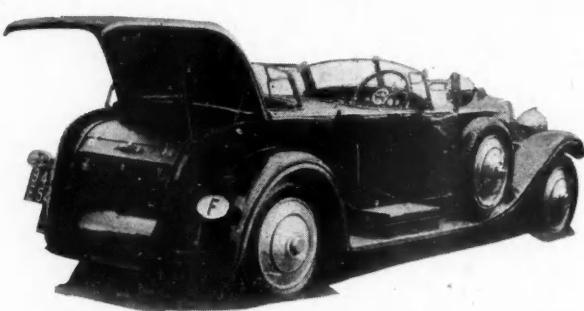
Citroen six, with a custom-built body by Busson, which received considerable attention at the French body contest. Note how the hood is merged with the fenders, and the spare wheel is recessed

two-speed transmission.

The body is a wood and metal, two-door, five-passenger coach and is the first of this type to be built by C. T. Weymann. A change has been made from fabric leather covering below the waistband to sheet metal paneling in order to meet the present demand for highly polished surfaces. The Weymann basic principle, however, remains unchanged. The portion above the waist-

band is in black leather. The color scheme is yellow below the waistband, for the hood and for the fenders, and black above. Nitro-cellulose paint is used. The seats are carried directly on the chassis frame members; the body frame has considerable flexibility and is assembled by angle irons without wood coming in contact with wood.

The body being flexible despite the sheet



An Hispano sport model exhibited in the Paris body contest, showing the special compartment for trunks. The hinged top is extended to cover the gasoline tank

metal paneling, considerable movement is provided for between the doors and the frame. The hinges are a patented type which can be adjusted in both a vertical and a horizontal plane. The door catch allows for a relative movement of door and frame in two planes. The windshield, which is in one piece and hinged at the top, is recessed so as to be flush with the body uprights and to round into the roof. A pigskin trunk is mounted on the rear platform. One spare wheel is mounted across the rear. The wheels are of aluminum cast in one piece with the brake drum, and has vane-type spokes to assist in cooling the tire.

Among other bodies showing unique treatment was one by Busson, mounted on a Citroen six chassis, with hood and fenders merged, and the running board eliminated by the extension in the width of the body. A spare wheel is carried just ahead of the door of the car, in a recessed compartment.

Another treatment of the streamline effect was noted in the Hispano sport touring car. As the illustration on the preceding page of this article shows, the rear deck cover is carried down over the gasoline tank, and the compartment allows ample space for the storage of baggage.

Fuel Distributor for Oil Engines

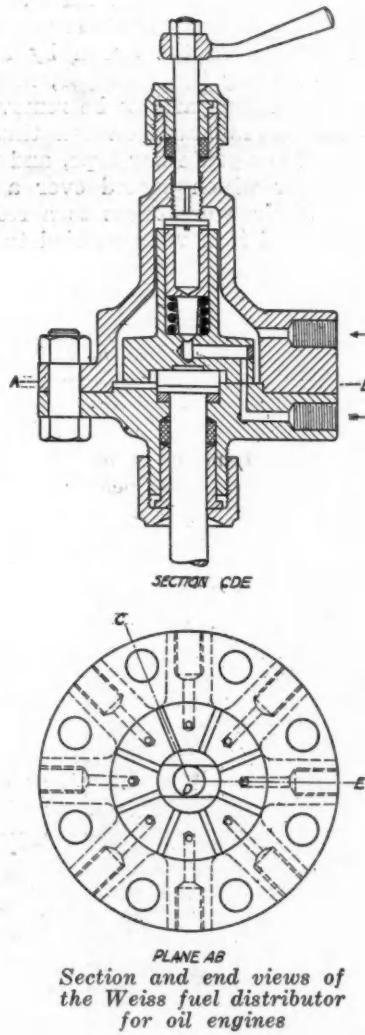
A FUEL distributor for multi-cylinder oil engines with airless injection has been invented by Carl W. Weiss of the Weiss Engineering Corp., New York, and a working model in accordance with the design shown herewith is now being built. It operates under a pressure of 1500 lb. p. sq. in.

Referring to the sectional view, the distributor comprises a housing within which there is a rotary distributor disk. This disk is driven from the engine crankshaft and is geared to make one revolution per crankshaft revolution in the case of a two-cycle, and one revolution to two of the crankshaft in the case of a four-cycle engine. The face of the disk bears against the head of the distributor, in which there are radial grooves equal in number to the number of cylinders to be served, and drill holes located centrally between adjacent grooves. Each drill hole communicates with the combustion chamber of one cylinder of the engine. Within the distributor disk there is an axial drill hole opening to the top, which communicates with a radial drill hole plugged at its outer end, the latter in turn communicating with a drill hole parallel with the axis of the disk and debouching on the bearing face. The disk has an upward extension or hub which is drilled out to receive a piston that is forced upward against an adjustable stop by a coiled spring. In operation the oil enters the dis-

tributor through the upper one of the two threaded holes on the right, as indicated by the arrow. The oil comes from a reservoir in which it is maintained under pressure. All of the space surrounding the distributor disk is normally filled with oil under the pressure maintained in the reservoir. When the hole in the distributor disk begins to register with one of the radial grooves in the distributor head, oil from the space surrounding the disk begins to flow through the passage in the disk into the cylinder formed in its hub, forcing the piston therein against its stop.

Communication between the cylinder and the space surrounding the distributor disk is then shut off by the hole in the disk passing out of registry with the groove, and an instant later the hole in the disk begins to register with a hole in the distributor head communicating with one of the engine cylinders. Then the pressure of the oil in the reservoir surrounding the disk, pressing on the top of the piston, forces the oil from the pump cylinder into the engine cylinder.

In regular service the piston in the distributor does not strike the valve seat and control screw at each discharge and intake, but vibrates, and thereby becomes speed-governing to a certain extent. With a constant pressure in the housing the discharge volume depends upon the angular velocity of the distributor disk across the distributor head. In case a pipe connection between the distributor and any of the engine cylinders should break, or if the engine should stall with the distributor in communication with any of the cylinders, the flow of oil would be checked at once by the piston.



Section and end views of the Weiss fuel distributor for oil engines

DETERMINATIONS of the specific heats of petroleum vapors have been made by W. H. Bahlke and W. B. Kay, who have published their results and conclusions drawn therefrom in a paper presented to the Division of Petroleum Chemistry of the American Chemical Society. The specific heat of the vapors of five petroleum distillates was determined over temperature intervals varying from a temperature just above where they are completely vaporized to 650 deg. Fahr. The results can be expressed by the empirical equation:

$$C_p = 0.289 + (9 \times 10^{-4}) G + (5 \times 10^{-4}) t$$

where C_p = sp. heat at atmospheric pressure
 G = gravity, degrees A.P.I. at 60 deg. Fahr.
 t = temperature, deg. Fahr.

This equation fits the experimental data with an average deviation of 1.33 per cent and represents distillates whose gravity at 60 deg. Fahr. varies from 25 deg. to 75 deg. A.P.I.

Foundry Capacity Almost Doubled by Mechanical Handling Methods

Augmenting of the tonnage without enlarging the floor space was accomplished largely because the location would not permit additional plant construction.

By L. W. PARDEE

Plant Engineer, Wilson Foundry & Machine Co., Pontiac, Mich.

FROM 450 to 500 tons of castings for Willys-Knight and Whippet cars are produced daily at the Pontiac plant of the Wilson Foundry & Machine Co., in buildings that were originally designed for about half of this production. Installation of mechanical handling methods and equipment has made possible practically a 100 per cent increase in productive capacity without building expansion.

The foundry building layout consists of the foundry proper, which is about 350 by 500 ft., adjoined at one end by the core room—about 200 by 350 ft.—and which has a sand storage building beyond it about 80 ft. wide and 330 ft. long. The cupola building is located at the far end of the foundry building from the core room and contains five 96 in. cupola furnaces.

This entire group of buildings is located between a railroad siding and a city street so that there is no room for expansion. The last of the buildings was erected in 1919. At that time, all of the molding was of the floor type. The only mechanical handling of material was in the unloading of sand by means of a crane, and of iron ore by a magnet crane operated from a locomotive.

All handling work inside the foundry was performed manually with a night crew shaking out and preparing the sand. It taxed the capacity of the foundry to produce 250 tons of castings per day.

The mill room and the chipping room are located on the machine shop side of the railroad siding. They are connected with the foundry by means of a tunnel under the tracks so that all castings have to pass through this before leaving the foundry.

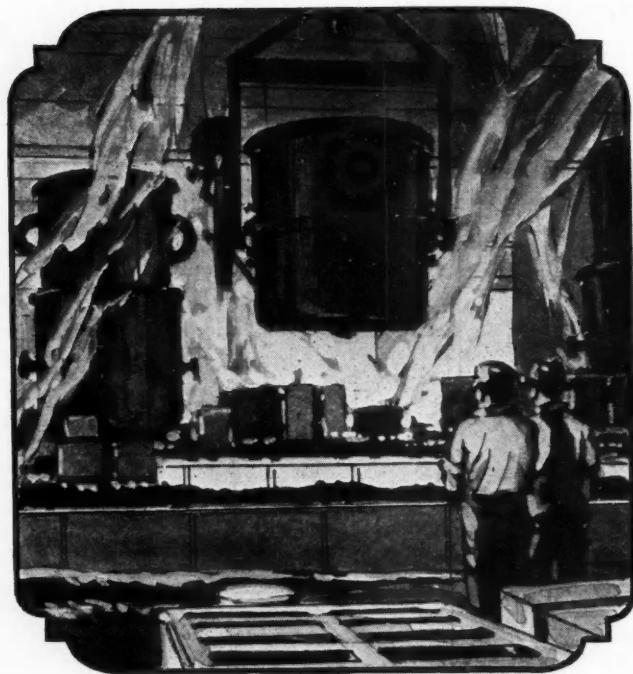
As production increased gradually, the management was confronted with the problem of augmenting the tonnage capacity without

enlarging the floor space. Thus the selection of mechanical handling equipment was influenced not only by what it was wished to accomplish but also by the fact that it had to go into buildings already erected.

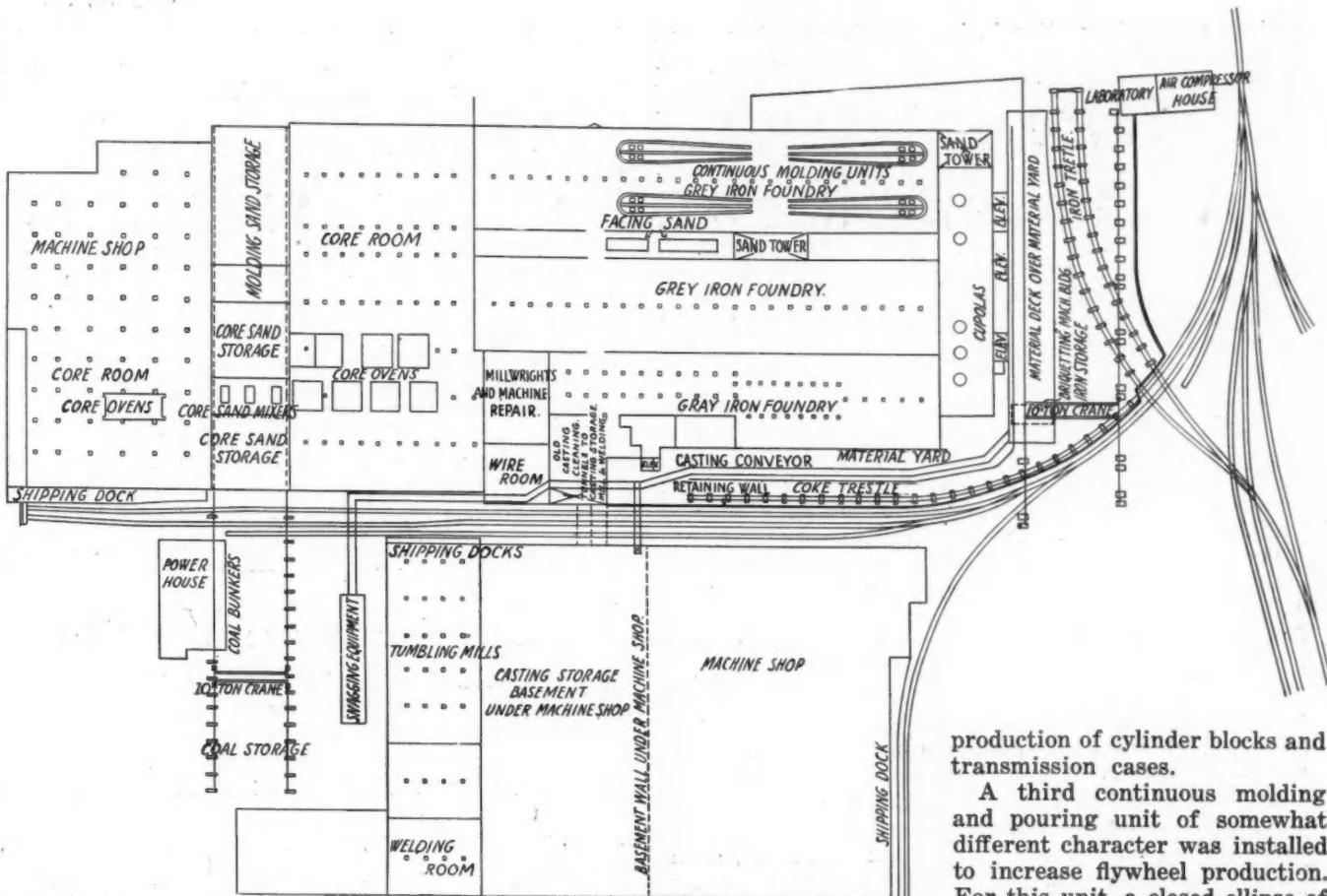
The first mechanical handling equipment installed was an apron conveyor used for snagging castings in removing sprues and large cores. The castings were loaded onto platform trucks at the molding floors and were hauled to this snagging conveyor, lifted from the trucks to the apron by air hoists and, as they passed along the conveyor, men with hammers would break off the parts to be removed.

The cores and iron fell through the apron, which was of the grate bar type, and were collected on a belt conveyor which passed over a magnetic pulley. The core blocks were taken to a refuse bin while the core wires and iron were carried to trucks from which the good material was salvaged. Good castings passed off the snagging conveyor to a second apron conveyor, which took them through the tunnel under the railroad tracks to the mill room. This installation simplified the work of the clean-up gang but did not increase the capacity of the foundry.

The next installation made was a continuous molding and pouring unit which was installed in one-half of one of the foundry bays occupying a space of about 55 by 350 ft. This unit consisted of sand handling machinery and a roller table equipment along which molds passed. A sand tempering room and storage bins were erected at one end of the space, and from these, belt conveyors were run through the roof trusses to the point where the sand is to be used and where it is plowed off into small service storage bins. These bins have an apron, motor driven feeder on the bottom. The control of the feeder is synchronized with that of the sandslingers.



This paper was presented at the materials handling meeting of the American Society of Mechanical Engineers held in Detroit.



Plan drawing of the Pontiac plant of the Wilson Foundry & Machine Co., showing how departments are located for efficient handling of materials

The sandslingers are of the swinging arm type. Each serves two patterns so that it can be kept running nearly continuously. After the flasks are filled, they are stripped from the platforms and placed on a bottom board on the roller table and pushed along, the drag being molded on the end machine and the cope on the next one.

As they pass along the conveyor, an operator molds the runner box and clamps the mold before it arrives at the pouring station. Molds are moved along the roller table by means of air pushers. After being poured, and the iron being given time to set, the flasks reach the end of the roller table and are dumped. Here the cope is lifted off by means of a vibrating shake-out bale, the sand goes through a grating and the empty flask is placed on a return roller table.

The casting is lifted out and the drag flask shaken out just as the cope flask was. The sand shaken out here is pulled to one side by means of a reciprocating conveyor and is returned to the sand tempering room. The molding machines are also placed on gratings under which are reciprocating conveyors so that all sand spilled is returned automatically to the storage bins.

This molding unit consists of eight sandslingers arranged so that molds move along four lines of roller tables and each line will produce from 500 to 700 flasks per day. All cores are placed in the molds on the roller tables between drag and cope molding operations.

About two years after the installation of this first unit, a second was placed in operation. It was almost identical with the first, except that it was necessary to place the sand tempering unit in the center and over the roof of the building as there was no room for it at the end of the unit. These two units are used in the

production of cylinder blocks and transmission cases.

A third continuous molding and pouring unit of somewhat different character was installed to increase flywheel production. For this unit, a closed ellipse of roller table was installed and the molding equipment was placed at one end. The molding equipment consists of a turntable about 15 ft. in diameter on which are mounted various molding machines with flywheel patterns. Overhanging one side of the turntable, a sandslinger was placed to feed sand from an adjoining pit.

As the turntable revolves, the patterns come successively under the sandslinger and the molding is continuous. After being assembled on the roller table, the flasks are moved along by air pushers, are poured and then dumped at the far end of the ellipse.

Sand dumped here is worked back to the pit by means of a sand cutter and is tempered in the cutting. This system works very well for this type of molding, as the quantity of sand required for flywheels is relatively small.

These changes of molding methods increased production to such an extent that something had to be done to expedite the handling of raw materials. When the foundry was built, two spur tracks were run across one end on a trestle with the idea that coke could be dumped from hopper bottom cars and that the height of the trestle would provide ample storage capacity. This proved to be wrong, however, since but one car could be dumped at any point.

The space besides the coke storage was to be used for iron storage. A traveling crane equipped with a magnet to lift the iron from the cars to storage. In order to secure adequate coke storage, a spur was run along one side of an inclined trestle so that there is now storage for more than two cars of coke for each car length of trestle. Some bays under this trestle are used for limestone storage, this material also arriving in hopper bottom cars. The original spur tracks are now used for handling pig iron, scrap iron and steel.

The original practice in loading the cupola was to load iron and coke on an industrial truck in the yard, push it to an elevator which raised it to the charging floor and then to transfer the load to the cupola by hand. The new method employs a charging machine with a cylindrical bucket for holding material. This bucket has a separate side and bottom, the latter being cone-shaped so that when the side is lifted the load will flow out to the edges of the cupola.

Special Monorail Hoist

These buckets are used for both iron and coke and are handled at the cupola by means of a special monorail hoist traveling on a bridge so that it can move in all directions. The hoist is motor-driven in all directions and has separate hoists for shells and the bottoms of the buckets.

For loading the buckets, a charging deck was built outside the cupola building with its floor at the charging floor level. This deck is served with iron by a 10-ton bridge crane with two magnets which passes over the railroad siding as well as over part of the deck. For handling the buckets on the deck, a 3-wheeled trailer built to hold one bucket is used and these are hauled around the deck by a tractor.

To make up iron charges on the deck, a series of scales were installed and so spaced that when the charging bucket trailers are hooked together, every one is on a scale. The different kinds of iron are always loaded at the same point and then the trailers are pulled along one length and another part of the charge loaded. When they reach the last scale, each bucket is loaded with its complete charge of about three tons.

To obtain coke, a monorail crane of three-ton capacity runs from the charging deck alongside the trestle where coke is dumped from railroad cars. This crane carries two buckets of coke at each trip. From the charging deck, the buckets of coke are taken on trailers to the charging floor in the same manner used for iron.

Few Operators Required

For a production of from 400 to 500 tons of castings per day, this system requires two outside crane operators, two operators on the charging floor, one operator at each of the 96 in. cupolas, two men for loading coke into buckets, 11 men for making up the iron charges, two tractors with one driver, and four men for handling trailers.

Increasing production all along the line in the way described brought up the problem of handling the product after it has been cast. Work was begun recently on a conveyor system for taking the castings from the end of the continuous pouring systems through a cooling period and then through snagging operations.

A monochain conveyor carrying a steel basket or tray will run across the end of the continuous pouring roller conveyor where the flasks are dumped. Here, the casting will be lifted from the molds, placed on the trays and carried to the outside of the building. This monochain conveyor runs around the end of the foundry and passes underneath the charging deck where several loops are made in it to increase the cooling time. It passes to the opposite side of the foundry buildings and across the railroad tracks to the knockout machines which are located just outside the mill room.

While on these trays, the sprues will be knocked off, and placed on a truck to go back to the cupola.

When the castings reach the knockout building they are lifted from the trays by means of air hoists and placed on the machines on which the cores are vibrated out. The castings will then be carried to the mills.

Eight different types of castings will be handled on this monochain conveyor, so that sorting will also take place when they are removed from it. Cores and wires drop from the knockout machines onto apron conveyors which discharge into a hammer type crusher, where all lumps are reduced to three in. in diameter or smaller and wires are freed from lumps.

The material then passes over a magnetic separator belt, where the wires, fins and miscellaneous iron is removed and placed on a truck while the sand passes on to a continuous bucket elevator. This carries the sand to a screen mounted on the top of a storage bin, where the fine sand is separated out. Fine sand goes into a bin for return to the foundry for reworking. Coarse sand and lumps pass into a refuse bin from which they are removed by trucks.

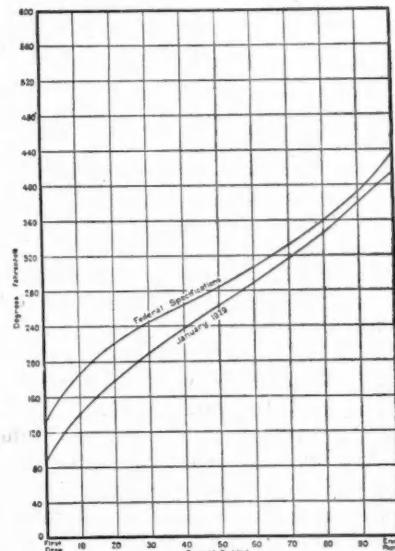
Gasoline More Volatile

ACCORDING to the nineteenth semi-annual motor gasoline survey, made by the Bureau of Mines, gasoline being marketed in the United States is slightly more volatile than that sold a year ago. This characteristic is shown by a slight lowering of the distillation temperatures, particularly at the average initial and 20 per cent boiling points.

The tests were made from samples obtained in 12 different cities. The average figures indicate a general trend toward the sale of a more volatile gasoline and a common tendency toward the marketing of a standardized product as individual variations from the average, with the exception of a few blends, are small.

There is a tendency toward better fractionation in the manufacture of gasoline, which was noted in the previous surveys also, as the average difference between the end points and the 90 per cent points is notably less than in the earlier surveys. The accompanying chart shows distillation curves representing the present Federal specifications for motor gasoline and the average of all samples in the present survey.

ACCORDING to the latest official statistics at the end of December, 1928, there were 26,327 passenger cars in service in the Irish Free State and 15,059 in northern Ireland, as compared with 22,415 and 13,502 at the end of 1927. In the city of Dublin the number of private passenger cars increased from 3461 in 1927 to 4039 at the end of 1928.



Distillation curve of average gasoline

Just Among Ourselves

"Companion" Lines Are Difficult Sales Problems

COMPANION" lines always have presented a somewhat difficult retail sales problem. Whether in the sale of automobiles or iron and steel products or any other kind of merchandise, the salesman or sales agency given two or more products to handle almost always has handled one line more efficiently than another.

The cycle usually has been something like this: A manufacturer is selling one line fairly successfully. He adds a new line, higher or lower in price, and starts to sell under a different name through the same marketing organization. The marketing organization either gets greatly excited about the new line and neglects the old one, or fails to warm up over the new one and continues to concentrate on the old one.

Then something must be done about it. First, sales promotion and internal pressure is put on the marketing organization to get behind the line which hasn't been selling. When that pressure is successful, it often turns out that the previously successful line is found to have slipped in the meantime.

Finally, in the automobile field at least, the answer has usually been separate retail sales personnel for the two lines. This is what has happened in the past when final success has been achieved. If current reports are to be credited, history is now in the process of repeating itself.

* * *

Separate Sales Forces Defeat the Idea's Purpose

WHEN separate sales forces do solve the problem, however, it often happens that one of the chief reasons for bringing out the new line has been

lost, that chief reason having been to reduce marketing cost through selling more merchandise with approximately the same selling organization. It's a tough circle to get out of and it is not always easy for a manufacturer to know the exact point in the cycle which he has reached at any given time.

* * *

Credit Ratings of Salesmen Something to Worry About

AN automobile distributor, a credit man and a banker were sitting at lunch the other day. The discussion turned to business and individual credit ratings. Said the credit man with some asperity: "If a man coming to me for credit puts down his occupation as 'automobile salesman,' I wouldn't lend him anything."

Then the fight began. This particular automobile distributor was disturbed, however, in his own mind. He has begun to worry about a business in which retail representatives could get a reputation like that even in one responsible credit source. But he hasn't stopped with worrying. He is figuring on spending several thousands of his own hard-earned dollars in the next year or so to attract and educate as automobile salesmen energetic, reliable young men from other lines of business. He's going to make his own back yard just as clean and profitable as he can make it.

This distributor, naturally, is a successful one. He is going to do something about it. The unsuccessful ones just worry.

* * *

Used Car Sales Data Aids Stabilization

CHEVROLET has announced that in May, 1929, its dealers sold 157,624 used cars, an increase of more than 33 per cent over the same month a

year ago. April, 1929, used car sales were announced as 133,887.

These are the first actual national used car sales figures we have ever seen published.

Retail stability in the automobile business would be very favorably affected if other manufacturers collected similar figures and published them monthly. Many makers already keep such records concerning the used car sales of their own dealers in their files. It is sincerely to be hoped the Chevrolet will continue the regular publication of its figures and that at least five or ten other important manufacturers will fall in line with the practice.

* * *

Automobiles Indirectly Affected by Tariff

SEVERAL important automotive executives are down in Washington as we go to press appearing before a Senate committee in connection with a proposal to transfer automobiles to the free list in the new tariff bill. Under existing law automobiles carry a 25 per cent ad valorem duty. Unlike most other industries, the automobile business is likely to be much more affected by the tariff put upon other products than by any decrease or change in tariff actually applied to automotive products as such. The only fear of foreign invasion of American automobile markets, as a matter of fact, would seem to be from the possibility of future American-operated plants abroad using American methods and cheap foreign labor. Direct, immediate foreign competition in this country doesn't look like any very serious possibility. High duties on certain other products, however, might affect quite definitely American automotive sales abroad.—N.G.S.

American Automobile Association Urges More Federal-Built Roads

Organization protests the diversion of motor vehicle and gasoline tax funds to public projects other than highway maintenance and traffic regulation.

FIVE big, new projects appear on the program of the American Automobile Association following its twenty-seventh Annual Convention held in Buffalo, N. Y., July 1 and 2. These include action for the protection of motorists on the public highways from gunplay; the appropriation of more money for the building of forest roads by the Federal Government; the rendering of service to voyagers who wish to travel by water or air as well as by land; the elimination of "gas gyping" now practiced by some filling station operators, and the regulation of gasoline taxes in states where legislators believe "the sky is the limit" in this form of revenue.

President Thomas P. Henry, in his opening address, roundly scored the killing of innocent motorists by government representatives who mistake them for criminals.

Decries Violence

"As an association and as individuals, we stand behind the laws of our country," said President Henry. "We have no sympathy for the criminal, for the bootlegger or for the smoke screen artist. But the enforcement of any statute does not justify the killing or injuring of a single innocent motorist. The first duty of a stable government is to protect the law-abiding citizen."

In a resolution, the association recommended that "all federal, state and local officers patrolling the highways, be required to wear a distinguishing uniform."

The convention went on record as favoring an earnest campaign to induce the Federal Government to increase its appropriations for road building, especially in the forests of the West. "The fact cannot be ignored," said the resolution, "that congestion upon the highways is increasing at a greater rate than our roads are expanding. The American Automobile Association reaffirms its position that the road-building needs of the country have advanced to the stage where Congress should increase the Fed-

eral Aid appropriations from \$75,000,000 to \$125,000,000 annually.

"More than one-half of the area of the eleven Western States, known as the Public Land States, is owned by the Federal Government and not subject to state taxation. The American Automobile Association reiterates its position that the construction and maintenance of highways through and across these areas is clearly an obligation of the Federal Government and urges congressional action in harmony with this policy.

"The national forests comprise an area of approximately 138,000,000 acres. This constitutes 40 per cent of the Federal domain. The fire losses in our national forests amount to approximately \$35,000,000 annually. The greatest percentage of this loss occurs in forest areas unprotected by road development.

"It would require approximately 30 years under present Federal expenditures to bring our forest roads up to the standard required within the next ten years. The American Automobile Association therefore favors an increase in the annual forest road appropriations from \$7,500,000 to \$12,500,000."

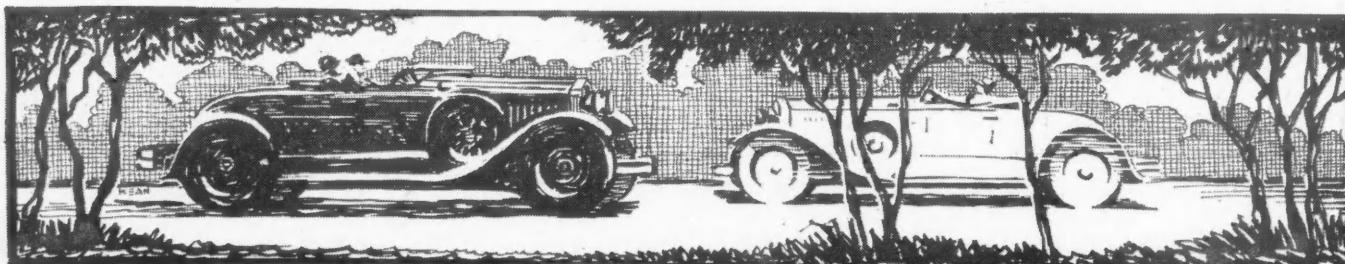
Water and Air Travel Service

The Automobile Association will soon branch into a service bureau for water and air transportation, according to a report of Ernest N. Smith, of Washington, general manager of the association. This will make it the only service bureau of this type.

"We must meet this situation candidly," Mr. Smith said, "and the best way is to direct our efforts vigorously into the new channels. We have already notified all affiliated clubs of our waterways service and within the next week each club will be notified of our aviation service and information plans."

Another resolution attacked the practice of "gyping" in the sale of gasoline and oil. The resolution read:

"A recent survey of the conditions throughout the country in the sale of oil and gasoline discloses that no commodity of such widespread use has been so loosely handled as motor fuel, from the standpoint of



laws and regulations to protect the car owners, who are losing millions of dollars annually through short measure rendered by dishonest gasoline venders and because of inadequate dispensing equipment.

"The national conference on weights and measures has rendered a signal service in drafting a model weights and measures law applicable to diversified conditions in the various states. The American Automobile Association recommends that the affiliated clubs take the initiative in remedying present conditions by urging:

"First, the adoption of new legislation on weights and measures in those states where the existing law is inadequate. Second, the setting up of state and local enforcement organizations with adequate personnel and sufficient authority to administer the law. Third, adequate appropriations by state legislatures providing for periodical check-ups on gasoline measuring devices so that the law may be enforced."

An important issue which resulted in another resolution is the gasoline tax. It was asserted that some states are diverting money derived from the gasoline tax into channels where it does not directly benefit the

motorist. It is said that these states use the money in building schools and in other community enterprises. The association held that the automobile should not have to pay for these and a resolution was passed providing that "the president should appoint a special committee to study the condition throughout the country in the matter of motor vehicle taxation, with special reference to constant increases in the gasoline taxes and the growing practice whereby some states divert motor vehicle taxes to purposes other than the construction and maintenance of roads and the regulation of traffic."

Other Resolutions Adopted

Other resolutions taken by the association at the convention included one favoring conservation of the nation's oil resources and opposing any attempt on the part of the oil interests to create an artificial shortage in order to boost prices; one favoring the preservation of roadside beauty; one favoring congressional legislation which will insure the proper regulation of toll bridges, and one urging the enactment of compulsory liability insurance.

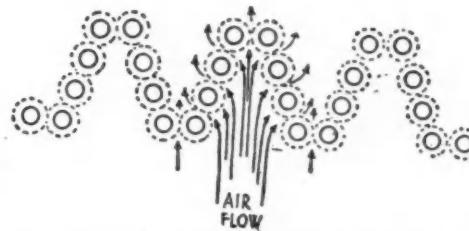
Weight Reduction Claimed for New Tubular Radiator

A TUBULAR radiator construction which has lately received attention in England is said to afford greatly increased radiation efficiency with 36 per cent reduction in weight. The tubes, instead of having sheet metal gills, are encircled by a spirally wound coil of wire, by means of which, it is claimed, a larger area of radiating surface is exposed to the air, for the latter passes through the gills instead of over them.

No impartial report of tests as to the relative efficiency of individual tubes of the two types is available at present, however, and the results obtained from radiators constructed of these wire-wound tubes are affected by the way in which the tubes are arranged between the upper and the lower tanks. Instead of being set vertically in a series of four or five staggered rows, front to back, there is one row only.

Whether it be due wholly or partially to the wire-encircled tubes, or whether the arrangement of the latter is primarily responsible, it can be said that one row

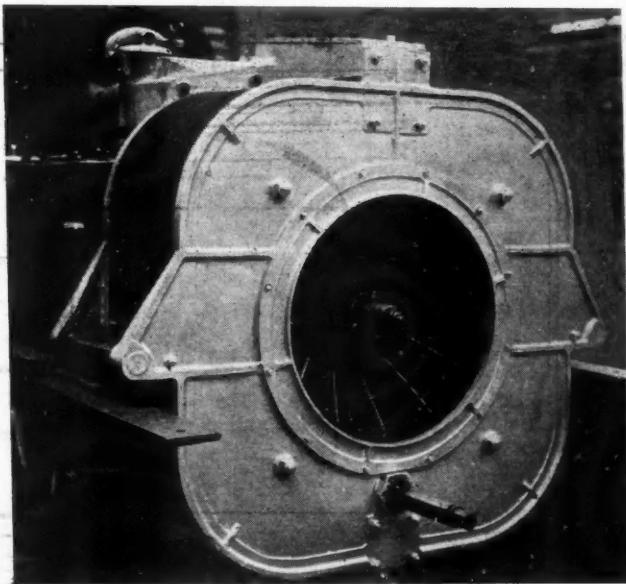
of these tubes in a radiator weighing, with water, 91.68 lb. is as effective as, if not more efficient than, an



Cross-section through single row of wire-gilled tubes of the Still radiator

ordinary gill'd tube radiator weighing 143.4 lb. The two types of radiator thus compared are those for a 5-ton truck, and the saving in weight is in similar proportion when a cellular radiator is used for comparison.

Radiators of this type are now being used by the makers of the Guy trucks and buses (Wolverhampton, England), and, in a special form, on the Guy six-wheelers supplied to the British Government for military service in India. The radiator for the latter vehicles has wire-gilled tubes arranged to encircle the fan in a framing that consists of front and rear end plates of aluminum, with top and bottom tanks; the front plate has a large central hole through which air is drawn by the fan and discharged radially through the wire gills of the tubes. As shown in the accompanying illustration, the front elevation is in the form of a square with the corners rounded off. Known as the Still tube, this radiator is made in England by the Clayton-Dewandre Co., Lincoln.



Still radiator installed on a truck for use in India

STATISTICS of motor vehicle registrations in France during 1928 have been published recently. The numbers of different types of motor vehicles, etc., registered were as follows: Passenger cars, 757,658; motor trucks and delivery wagons, 330,683; vehicles fitted with gas generators, 905; cyclecars, 26,585; motorcycles, 301,914; pleasure-type motor boats, 3929.

Starting Efficiency of Gasoline Varies With Atmospheric Changes

That quality also is affected, however, by the mechanical condition of the engine, spark regulation, the air-fuel ratio and the temperature.

By N. L. EGBERT

Instructor in Research and Commercial Testing, Cornell University

THE following comments and conclusions relate entirely to the fuel characteristics necessary for satisfactory engine starting under different temperature conditions, and the method of specifying fuel characteristics in order to assure satisfactory starting.

There are four main factors upon which engine starting depends, as follows:

1. The mechanical condition of the engine.
2. A sufficient supply of electrical energy during the cranking period to produce an adequate spark in the cylinder.
3. The air-fuel ratio resulting when the carburetor is choked.
4. The air-vapor mixture which will be formed in the cylinder by the particular gasoline at a given atmospheric temperature and the given air-fuel ratio.

From the work done by C. S. Cragoe and J. O. Eisinger at the Bureau of Standards and published in the *S.A.E. Journal*, March, 1927, we find that the number of engine revolutions required for starting is a function of the resultant air-vapor mixture formed in equilibrium air distillation and may be expressed by the equation,

$$\log_{10} M_r = 1.301 - \frac{2}{N} \quad (1)$$

where M_r is the resultant air-vapor mixture formed in equilibrium air distillation and N is the actual number of engine revolutions required to start.

In order to predict the starting characteristics of a given fuel it is therefore necessary to determine the resultant air-vapor mixture formed in equilibrium air distillation under any given set of conditions.

From the work published by Oscar C. Bridgeman in the

S.A.E. Journal, April, 1928, it is possible to compute the resultant air-vapor mixtures formed in equilibrium air distillation from the A.S.T.M. distillation data. It is therefore possible to determine engine starting ability for any given fuel directly from the A.S.T.M. distillation data for that fuel.

To assure satisfactory starting characteristics, the temperatures at which various fractions must have passed over in the A.S.T.M. test may then be specified.

A.S.T.M. distillation tests were made on 11 commercial gasolines available in this locality, in order to determine their relative starting qualities. It should be noted that whether or not the values obtained from the Cragoe and Eisinger equation—

$$\log_{10} M_r = 1.301 - \frac{2}{N}$$

are absolutely correct, they nevertheless place the fuels in their correct relative order.

In order to predict the engine starting abilities of the various fuels from their A.S.T.M. distillation data it is necessary to first convert A.S.T.M. distillation curves to equilibrium air distillation curves. From the work of Mr. Bridgeman above noted this conversion can be accomplished as follows:

The ratio R , of corrected* A.S.T.M. absolute temperature to the equilibrium air distillation absolute temperature for any given percentage evaporated is independent of the particular gasoline and can be expressed by the equation,

$$R = 1.372 + 5 \times 10^{-3} (M_r - 16) - 45 \times 10^{-6} (P - 50)^2 \quad (2)$$

Where R represents the ratio defined above and M_r is the resultant air-vapor mixture formed in equilibrium air distillation for P , percentage

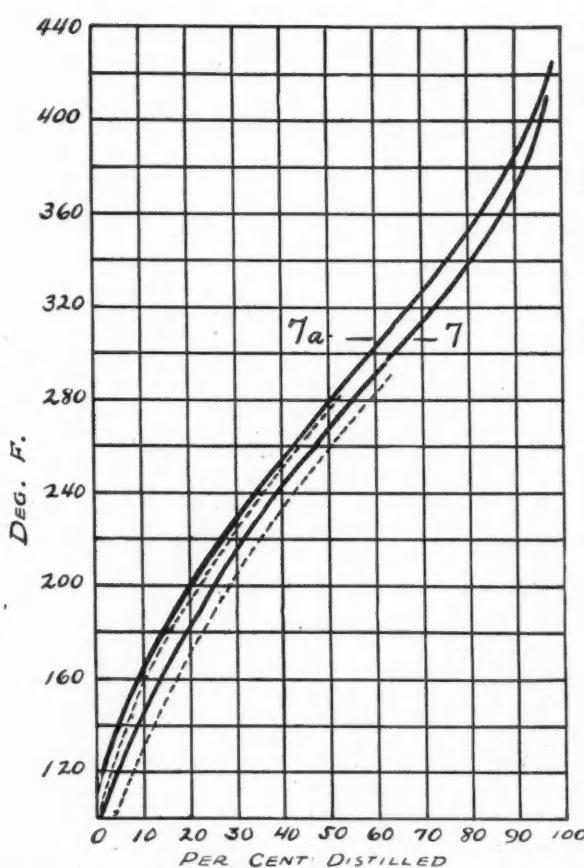


Fig. 1—A.S.T.M. distillation curves for fuels 7 and 7-a (The dotted curves represent corrections made for loss)

* The corrected A.S.T.M. distillation curve is obtained by offsetting the observed data by an amount equal to the distillation loss.

evaporated. R was therefore computed for values of $M_r = 20, 16, 12, 8$ and 4 , and the corresponding values at various percentages evaporated are presented in the form of curves shown by Fig. 2. From these curves it is possible to determine the value of R for any desired percentage evaporated corresponding to resultant air-vapor mixtures of from 4 to 20 . Since

$$R = \frac{\text{Corrected A.S.T.M. abs. temp.}}{\text{eq. air distillation abs. temp.}} \quad \dots \dots \dots (3)$$

the equilibrium air distillation temperatures may be determined. A set of the equilibrium air distillation curves so derived is shown in Fig. 3.

The following numerical example will illustrate the procedure necessary to determine the equilibrium air distillation curves from the corrected A.S.T.M. distillation data. For gasoline No. 1, find the equilibrium air distillation temperature for 10 per cent evaporated to form a 12 to 1 resultant air-vapor mixture. From Fig. 1 we find that the corrected A.S.T.M. temp. at 10 per cent evaporated is 132 deg. Fahr. (592 deg. Fahr. abs.). From Fig. 2 at 10 per cent evaporated to form a 12 to 1 resultant air-vapor mixture we find that $R = 1.28$. Solving equation (3) we find that the equilibrium air distillation temperature is 463 deg. Fahr. abs. or 3 deg. Fahr. Other points to complete the equilibrium air distillation curves for the various fuels are found in a similar manner.

In order to predict engine starting ability for a given fuel under any given temperature encountered in service it is necessary to know the resultant air-vapor mixture formed in equilibrium air distillation at the given temperature so that we may make use of equation (1) and thereby determine the number of revolutions required to start. The resultant air-vapor mixture formed is dependent upon two factors, (1) the ability of the fuel to form vapors at the given temperature,

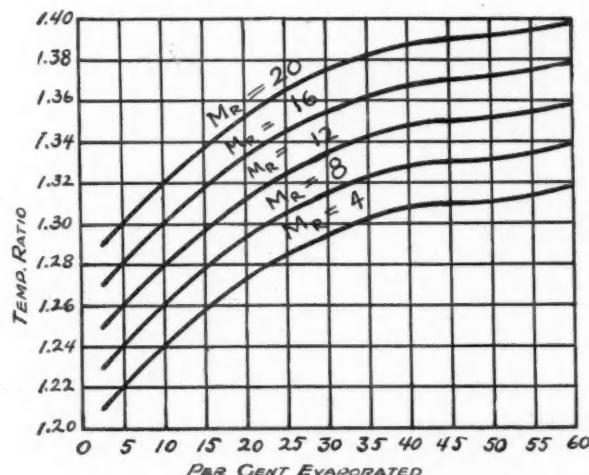


Fig. 2—Ratio of A.S.T.M. temperature in deg. abs. Fahr., to equilibrium air distillation temperature in deg. abs. Fahr., plotted against per cent evaporated for resultant air-vapor mixtures of $20, 16, 12, 8$ and 4

or its volatility, and (2) the air-fuel ratio supplied on "choke."

With present-day carburetors it is possible to supply an air-fuel ratio on "choke" of from 1 to 1 , to 2 to 1 . With a given air-fuel ratio supplied the percentage evaporated to produce a desired resultant air-vapor mixture can be computed from the equation,

$$M_r = \frac{100 M_s}{P} \quad \dots \dots \dots (4)$$

Where M_s and P are as above noted and M_s is the air-fuel ratio. When the percentage evaporated to produce a given resultant air-vapor mixture is known, the

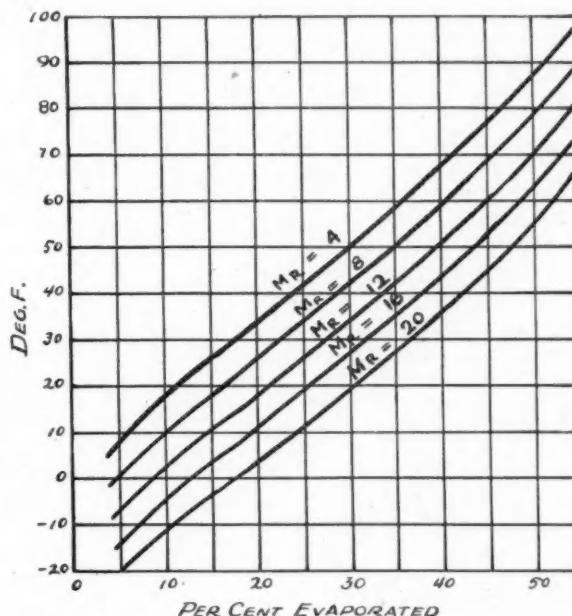


Fig. 3—Equilibrium air distillation curves for gasoline No. 1

equilibrium air distillation temperature for the given fuel may be obtained from Fig. 3, and the curve Fig. 4, may be constructed. From Fig. 4 it is possible to determine the resultant air-vapor mixtures that a given temperature will produce.

In order to predict the number of engine revolutions required to start an engine in good mechanical condition it is necessary to know the average temperature encountered in service in the particular locality where the fuels are to be used. These temperatures are available from the U. S. Weather Bureau. With the temperature known, the resultant air-vapor mixture formed can readily be obtained from Fig. 4. Knowing the resultant air-vapor mixture thus formed the number of engine revolutions required to start can be determined from equation (1).

In the present case a somewhat different procedure was followed. A curve representing equation (1) was plotted and the air-vapor mixtures formed by the different gasolines at the given temperature were spotted on this curve. This was done for the average minimum "winter" temperatures of 2 deg. Fahr. and for the average "winter" temperatures of 30 deg. Fahr., the averages being taken over a period of 20 years.

The relative starting ability with some of the fuels tested is shown graphically by their location on the curve of Fig. 5. The plain numbers represent the regular gasolines, while those numbers followed by the letter "a" are the so-called "special" or extra premium gasolines.

Thus for engines in the same mechanical condition the A.S.T.M. distillation data, used in conjunction with the above correlation, is the only data that is needed to predict the starting quality of a gasoline.

The method outlined also makes it possible to specify in terms of the A.S.T.M. test the necessary requirements for "satisfactory" engine starting for the various

temperature conditions encountered in service. In order to do this it is first necessary to define "satisfactory" starting. For the purpose of this specification "satisfactory" starting will be arbitrarily defined as a start in 8 to 10 revolutions for average temperature conditions and in 20 revolutions for the average minimum temperatures encountered. Substituting values of $N = 9$ and 20 in equation (1) we find that $M_r = 12$ to 1, and 16 to 1 respectively in order to obtain a start in 9 and in 20 revolutions respectively. Assuming the carburetor will supply an air-fuel ratio on "choke" only as rich as 2 to 1 (which is on the safe side, as it is reasonably certain that some will supply a 1 to 1), and substituting in equation (4) we find that $P = 16.66$ per cent and 12.5 per cent to obtain resultant air-vapor mixtures of 12 to 1 and 16 to 1 respectively. Under these conditions we find from the curves of Fig. 2, that $R = 1.302$ (where $M_r = 12$ and $P = 16.66$ per cent), and $R = 1.308$ (when $M_r = 16$ and $P = 12.5$ per cent) respectively. Knowing the values of R and the average temperatures encountered in service the A.S.T.M. temperatures for the percentages evaporated to produce the desired air-vapor mixtures are fixed.

An example will illustrate the above general statements. With an average "winter" temperature of 30 deg. Fahr. (and 2 deg. Fahr. average minimum temperature) we wish to specify the A.S.T.M. temperature which will give "satisfactory" starting. In order to fulfill the conditions for "satisfactory" starting the fuel should furnish a 12 to 1 air-vapor mixture under the average "winter" temperature encountered, when a 2 to 1 air-fuel mixture is supplied by the carburetor, and

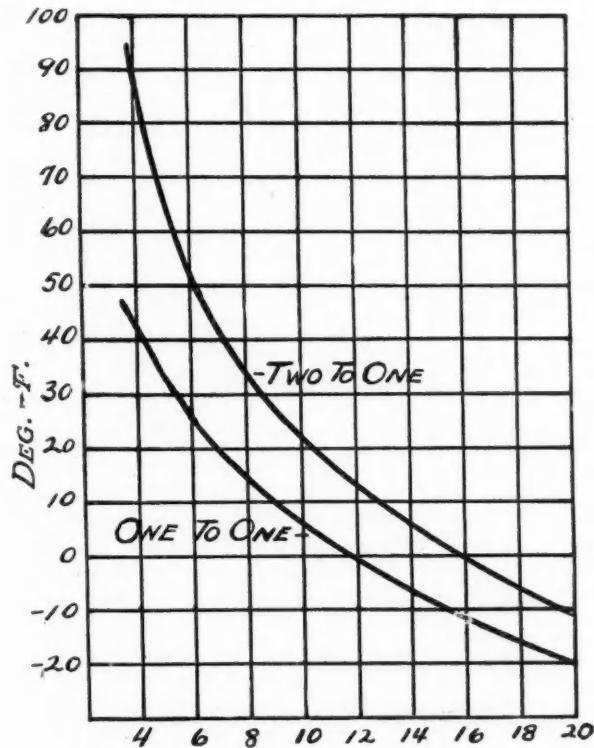


Fig. 4—Temperature plotted against resulting mixture ratio M_r

should furnish an air-vapor mixture not leaner than 16 to 1 under the average minimum "winter" temperature conditions. These air-vapor mixtures will give a start in nine revolutions under average "winter" temperature conditions and a start in not less than 20 revolutions under average minimum temperature con-

ditions. With the 2 to 1 air-fuel ratio supplied it is necessary to evaporate 16.66 per cent to produce a 12 to 1 air-vapor mixture (from equation 4). When $P = 16.66$ per cent and $M_r = 12$ to 1 from Fig. 2 it was found that $R = 1.302$. Thus to form a 12 to 1 air-vapor mixture with a 2 to 1 air-fuel mixture supplied it is necessary to have 16.66 per cent evaporated on the A.S.T.M. distillation at such a temperature that the ratio,

$$R = \frac{\text{A.S.T.M. deg. Fahr. abs.}}{30 + 460} = 1.302$$

Thus the A.S.T.M. temperature must not exceed 170 deg. Fahr. at 16.66 per cent evaporated (on a "cor-

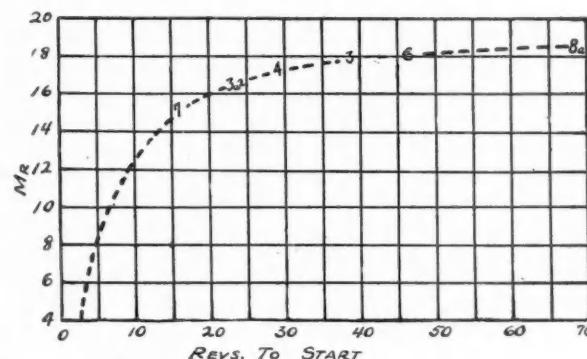


Fig. 5—Number of revolutions required to start engine plotted against mixture ratio (for average lowest winter temperature of 2 deg. Fahr. and $M_s = 2$ to 1)

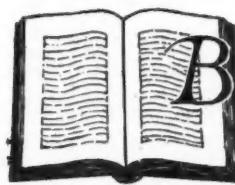
rected" A.S.T.M. curve). Similarly, to form a 16 to 1 resultant air-vapor mixture at 2 deg. Fahr. the A.S.T.M. temperature (on a "corrected" A.S.T.M. curve) must not exceed 145 deg. Fahr. Thus for any given temperature encountered in various localities the A.S.T.M. temperatures to give "satisfactory" starting may be specified.

In specifying the A.S.T.M. temperatures for "satisfactory" starting as outlined above, the temperature at which the more volatile fractions come over should not be made lower than required to give the desired starting ability, because of the relative scarcity of the high-volatility fractions; the greater handling loss that results; and because of the danger of the formation of vapor "locks" in the fuel line and in the vacuum tank due to the relatively high temperatures that exist under the hood.

It is also obvious that a satisfactory "winter" gasoline is much too volatile for "summer" use.

AT the recent Milan Fair the Italian O.M. firm, which has been specializing in passenger cars and has taken a rather prominent part in racing during the past four or five years, exhibited two Swiss Saurer commercial chassis both fitted with six-cylinder engines, one a gasoline and the other a Diesel engine. It could not be learned whether O.M. plans to represent Saurer in Italy or to take up the manufacture of these Swiss vehicles.

THE National Federation of the Automobile Industry, which comprises the various industrial organizations of the automobile and aircraft industries in France, recognizing the important services rendered to the French industry by the Automobile Standardization Bureau, recently made an important appropriation in favor of the bureau, in order "that it might intensify its activities for the general good."



Books for the Business Bookshelf

Corporation Profits

By Laurence H. Sloan, Harper & Bros., New York. 365 pp.
\$3.50.

THIS book contains the study of corporation profits, their size, variation, use and distribution in the period of prosperity, which formed a series of special supplements to Standard Trade and Security Service, of which the author is managing editor.

While the book is on accounting, its purpose is to examine the results of accounting; that is, the studies are made not from the viewpoint of the accountant, but of the average business man who must make decisions relative to security values, based either wholly or partially upon the facts set by accountancy. All the discussions are based upon studies of balance sheets of well-known companies and items treated include income accounts, balance sheets, depreciation, distribution of net profits, earnings on invested capital, current assets, inventories, etc. An interesting chapter is devoted to a study to determine America's largest industrial corporation in respect to total assets, current assets, invested capital, working capital, cash accounts and similar items. Of particular interest is the fact that concerns of automotive interests, including some of the larger oil companies, make up approximately 50 per cent of the 50 largest corporations determined in this manner.

Simple Aerodynamics and the Airplane

By Charles N. Monteith, The Ronald Press Co., New York.
418 pp. \$4.50.

THIS third edition has been revised by C. C. Carter of the United Military Academy and is based on eight years' experience in teaching the subject of Aerodynamics at the U. S. Military Academy in West Point. The presentation is not highly technical but sound fundamental principles have been developed and applied and sufficient descriptive matter added to equip the student in such elements of the subject as may be helpful to him in his work. Separate chapters are devoted to such items as the Aerofoil, Parasite Resistance, Propellers, Stability, Control Surfaces, Dynamic Loads, Materials of Construction, Equipment, and Navigation. Appendices include nomenclature for aeronautics, problems in simple air dynamics and in navigation, and a very good aeronautical bibliography.

Aircraft Year Book, 1929

Aeronautical Chamber of Commerce of America, Inc., New York City. 484 pp. Illus. \$5.25.

THIS eleventh edition of a very valuable compilation of aviation facts reviews a year in which the growth of aeronautical activities, particularly in the commercial field, were stupendous. During 1928 air transport lines flew twice the mileage of the preceding year, carried three times the quantity of mail, and more than four times the number of passengers. Traffic increased month by month and while a daily average of 5 tons of mail was flown during 1928, it averaged more than 7 tons in December. The book follows preceding editions and covers in comprehensive fashion all phases of aviation, and a considera-

ble variety of valuable statistics in connection with air transport operations, aerial service, manufacturers, airports and airways, military and naval aviation, are included in the book. The aircraft engine and design section contains sketches of practically all types of airplanes and airplane engines on the market today.

Airplane Stress Analysis

Alexander Klemin. Ronald Press Co., New York. 177 pp.
Illus. \$7.

THIS book is an introductory treatise on the art of airplane stress analysis and is especially designed for college students in aeronautics, engineers and designers who require an accurate, simple treatment of the subject. It has been prepared with particular regard to the stress requirements of the Department of Commerce, for the small commercial airplane. After a preliminary review of the principles of applied mechanics, the author takes a hypothetical airplane and carries through the analysis in the logical sequence much the way that an actual analysis is made, practically all the formulas employed being referred to in the earlier chapters on applied mechanics. Information about the materials of aircraft construction has also been included in the book.

Intensive Sales Management

J. C. Astley. The Dartnell Corp., Chicago. 273 pp.

THIS book is a revision and combination of two loose-leaf surveys undertaken by the writer several years ago into methods and practices found most effective by leading concerns in some 250 different lines of business. The case method has been used extensively throughout the book by citing actual examples to illustrate the points made by the author. Subjects covered include control in organization of sales headquarters staff, compensating salesmen, training, sales management manuals, arranging territory branch organization, and similar subjects.

Civil Airports and Airways

Simmons Boardman Publishing Co., New York. 238 pp.
Illus. \$4.

THIS book has been written for the purpose of providing in one place fairly complete information upon the selection, construction, equipment and operation of civil airports and airways. The author had the aid of 19 specialists in the different phases of airport construction and equipment and the resulting work is a very comprehensive and authoritative account of the present practice in airport design and construction.

The Marine Motor

By Frank W. Sterling, The Macmillan Co., New York. 132 pp.
Illus. \$2.

THIS book explains the design and operation of both two and four-cycle marine engine. Fundamental principles underlying the two classes are considered and then the merits and defects of each are discussed. The book is written primarily for motor boat owners and should be of interest also to motorists.

NEW DEVELOPMENTS—Automotive

Sundstrand No. 30 Rigidmil

SUNDSTRAND MACHINE TOOL CO., Rockford, Ill., has developed a No. 30 Rigidmil which is somewhat smaller than the standard No. 3 and is available with either mechanical or hydraulic feed. The hydraulic



Sundstrand No. 30 Rigidmil

feed unit is an Oilgear pump which provides any rate of feed between zero and 50 in. per minute. Rapid traverse is set at 103 in. per minute. Automatic table control is provided and causes the table feed to throw out within plus or minus .002 in. of a selected point.

Mechanical feed is optional and with it three pairs of pick-off gears for six feeds, from 1.49 to 22 in. per minute are supplied. Spindle and spindle driving pinion and shaft are all mounted on Timken roller bearings. A flywheel on the spindle sustains the smooth power flow delivered by the drive. The overarm is a solid steel forging, rectangular in shape and very rigid. The drive is by motor only. A 5 hp. 1200 r.p.m. motor is recommended. Coolant is pumped to the cutter at the rate of 6 gal. per minute. The hydraulic feed unit is self-lubricating. Vertical spindle head and rotary table are available for extra equipment.

Speed Reducers

FOOTE BROS. GEAR & MACHINE CO., 215 N. Curtis St., Chicago, has developed a complete line of vertical worm-gear speed reducers, designed particularly for the operation of mixers, agitators, paddles, etc. They are made in two different types, either the Type S commercial worm or the Hygrade worm gear reducer. With either type the use of standard speed motors is permitted. The vertical work gear speed reducers are similar to the standard horizontal type reducers except that a flange base is provided so that the reducer lies

on its side with the driving shaft to the right. The work gear revolves in the horizontal plane and the slow speed shaft in a vertical position. The reducer can be located under or above the machine to be driven.

Removable end plugs seal each end of the worm. The base is cast integral with the case; the worm is made of a high grade alloy steel, carbonized, hardened, ground and polished. The worm gear can be furnished either of semi-steel or bronze. The machines are fully enclosed, self-lubricating and require little attention except the occasional replacement of oil.

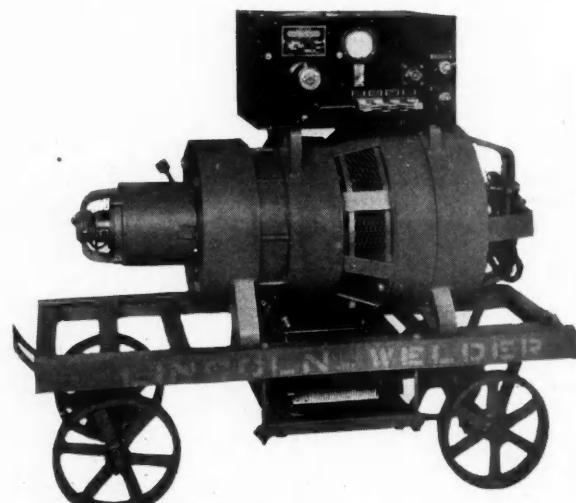
Workace Radial Saw

J. D. WALLACE & CO., 134 S. California Ave., Chicago, has developed the Workace radial saw which is said to have wide range of uses in woodworking plants. The machine is portable and can be shifted to suit the location of the work and adjusted to cut at any angle, for cross-cutting or ripping, dadoing or grooving, rabbeting, routing, panel raising, shaping, etc.

The motor is built-in and directly connected. The saw and motor unit are mounted on a turntable 6 in. in diameter which in turn is mounted on two heavy steel rods. The radial arm is mounted in the pedestal on a turntable 10 in. in diameter permitting the arm to be set in any position. The pedestal is also mounted on a turntable. By means of these turntables the machine is placed in position for any kind of cutting.

Lincoln Stable Arc Welders

THE Lincoln Electric Co., Cleveland, Ohio, have unified the controls of both motor and generator in their stable arc welders. The working mechanism of all controls is contained in a ventilated steel cabinet with hand regulators and switches mounted on



300 amp. portable welder with unified control

a panel. This control panel contains rheostat regulator, diverter switch, safety starter switch, voltmeter and wing nut terminals for cables.

Parts, Accessories and Production Tools

Schauer Electric Tools

THE Schauer Machine Co., Cincinnati, Ohio, has recently brought out two new portable electric tools—a $\frac{1}{4}$ -in. drill and a positive clutch screw driver. Both tools are equipped with powerful motors and the cover cap is removable without disturbing the bearings or electrical connections and permits inspection of the motor while running. They are ball bearing equipped with enclosed ball thrust bearing and heat-treated nickel steel gears running in grease. Studs of the same material are supported at both top and bottom.

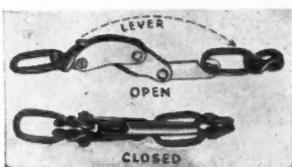
The screw driver is equipped with a screw slot finder and finder bit, but can be operated without the finder if necessary or with socket bits for nut tightening. No moving parts are exposed to mar the work in case of slipping or close corner operation. The positive clutch and thrust bearings are located in the gear head. This feature provides positive lubrication and permits the use of a large diameter clutch for greater strength.



Schauer quarter-inch drill
and screw driver

Bourquin Skid-Chain Hook

J. C. BOURQUIN, New Britain, Conn., has developed a new end hook device for anti-skid chains, which is easy to operate with no tools being required.



Device for anti-skid chains

Portable Electric Saws

THE Black & Decker Mfg. Co., Towson, Md., announces a new line of portable electric saws made in three sizes, 6 in., 8 in. and 10 in., with cutting capacities up to $1\frac{3}{4}$ in., $2\frac{1}{2}$ in. and $3\frac{1}{2}$ in. respectively. All saws are powered with universal motors, operating on alternating or direct current; chrome-nickel gears and shafts are used throughout with ball bearing equipment. Screws are adjustable from zero to 45 deg. and are notched for following pencil line on work. The depth of cut is adjustable for each saw from zero to

the maximum, the saw blade is entirely enclosed within a telescopic guard.

G. E. Electrode Holder

GENERAL ELECTRIC CO., Schenectady, N. Y., has developed a clamp-type electrode holder with jaws of heavier copper alloy, notched to hold firmly any size of electrode wire from $1/16$ to $\frac{1}{4}$ in. in diameter. A molded compound handle protects the operator from heat and from contact with current-carrying parts. The holder is designed for use with currents up to 300 amp.

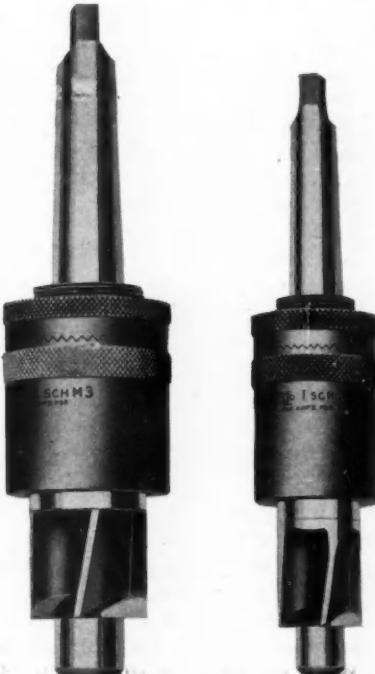
Rubshell Heat Proof Paint

RUBSHELL TEXAS, INC., Houston, Tex., has developed a heat-proof paint which withstands temperatures up to 1800 deg. Fahr. It is insoluble in oil, gasoline or other hydrocarbons and is insoluble in water or steam after having been submitted to 400 deg. Fahr. It is permanently adhesive to the true surface of steel and iron and its use on exhaust pipes and similar installations is said to prevent rust and corrosion.

Eclipse Stop Collar Holder

ECLIPSE INTERCHANGEABLE COUNTERBORE COMPANY, Detroit, Mich., has recently developed a quick-adjustable stop collar holder, the bushing of which can be adjusted instantly by hand without the use of wrenches, hammers or punches. This tool is recommended for use as a holder when counterboring, spotfacing, countersinking or core drilling to a specified length. The adjustable collar stops against the top of the fixture bushing, or against the work being machined, and regulates the depth of the cut or travel.

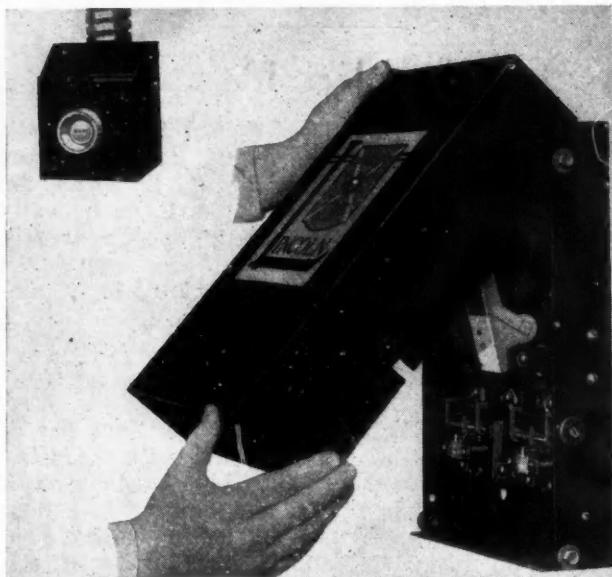
Instant adjustment of the collar is made by hand by backing off the upper lock nut, lifting the drive washer, turning the stop collar to the desired position and then lowering the drive collar and turning down lock nut. These tools can be furnished in sizes suitable for use with Eclipse standard and special counterbores, core drills, etc.



Eclipse quick-adjustable stop collar holder applied for use in a drill press

Lincoln Safety Starter

AN improved starter which starts a motor directly across the line has been developed by the Lincoln Electric Co., Cleveland, Ohio. The starter is controlled



View of Lincoln safety starter and (above) control button

by a Lincoln safety push button in which the red stop button encircles and protects the green start button, so that it is impossible to close the starting circuit unintentionally. Only four screws are required to hold the starter in place, and releasing two other screws permits the contractor panel to swing out thus making lead contacts easily accessible. The wiping action of the contact points prevents pitting and the cadmium-plated steel shields provide an instantaneous thermal and magnetic quench for the arcs.

Universal Truck Battery

THE Universal Battery Co., 3410 S. LaSalle St., Chicago, has placed on the market a new type of battery for buses and trucks. This battery is doubly insulated with genuine cedar and especially designed sheet rubber separators. The perforated hard rubber separator prolongs the life of the positive plate as it acts as a retainer and prevents excessive shedding of the active material or paste in the plates.

Worthington Air Compressors

WORTHINGTON PUMP & MACHINERY CORP., Harrison, N. J., has developed a new line of air compressors, employing Timken roller bearings on the main crankshaft journals. The line is of the single horizontal straight line type with capacities ranging from 100 to 300 cu. ft. per minute, operating at moderate speeds. Oil rings are mounted on the shaft beyond the Timken bearings and the crankcase is completely oil tight.

Regulation may be by an automatic starter and pressure switch mounted on the motor, or a pressure regulator may be attached to the compressor inlet

valves, holding them open to maintain constant air pressure. These compressors can be furnished with ball bearing idlers for short belt drive; with Tex-rope drives, using V-type ropes; or a synchronous motor may be directly mounted on the compressor crank-shaft, thus eliminating transmission mechanism.

Young Unit Heaters

YOUNG RADIATOR CO., Racine, Wis., has developed a combination unit heater placed in a recirculating box for forced heating of factories, garages, warehouses, and similar places. From one to four unit heaters are assembled in the recirculating boxes to make a heating installation much less expensive than the ordinary type of cast iron radiation steam coils, etc.

Adjustable Armrest

BERG BROS. MFG. CO., 4520 West North Ave., Chicago, Ill., has developed an adjustable armrest which is adjustable to any position and can be used for all cars in either the front or rear seats. The armrest can be dropped down out of the way when not in use and is easy to install with no holes to drill, the bracket simply slipping under the window molding.

Ward Battery Indicator

CECIL WARD, Los Angeles, Cal., has developed a device to indicate when water and voltage are low in automobile batteries. It is to be attached either to the dash or the steering column, and the galvanometer, controlled by the opening and closing of the circuit when water is low, constantly registers on the dial of the instrument.

To ascertain the strength of the battery the starter must be used when the needle swings into a red zone if weak. The new device is called the Uno battery indicator.



Uno battery indicator and its inventor, Cecil Ward

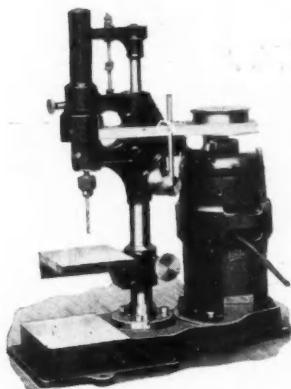
High-Speed Sensitive Drill

THE High Speed Hammer Co., Inc., Rochester, N. Y., has brought out Model R-53 High Speed sensitive drilling machine which is a precision tool designed to

care for all work from the smallest diameter hole up to $\frac{1}{4}$ in. Spindle speeds in the standard machine are 2700 and 5500 r.p.m. The hardened and ground spindle is guided by a vertical quill supported by angular ball bearings which take all belt pull. Two ball thrust bearings carry the top of the spindle at the feed arm.

Parts ground accurately to size and alignment include the spindle, quill, feed column, main column, table and base. The spindle travel can be set accurately by the convenient depth gage. Its

maximum travel is $2\frac{1}{4}$ in. The table can be adjusted in height, or entirely removed if necessary.



High Speed sensitive
drilling machine

Four-Hole Automatic Drill

A RATHER unusual machine tool installation has been made use of by a maker of automobile engines for drilling simultaneously four holes at different angles in cylinder blocks. The general layout of the equipment used is shown in Fig. 1 and consists of four automatic unit drill heads built by Millholland Sales & Eng. Co., Indianapolis, which have been brought together on a single base, and about a work-holding fixture.

All four drill head units are placed in operation by the movement of a single air lever. Locating pins are inserted in locating holes in the block and are withdrawn by the action of air pistons which are also controlled by a single lever alongside the starting lever.

The drill heads are cam operated and after being

started move quickly to working position, slow down to drilling feed and return automatically to loading position at the end of the operation.

The entire machine is set directly in the conveyor

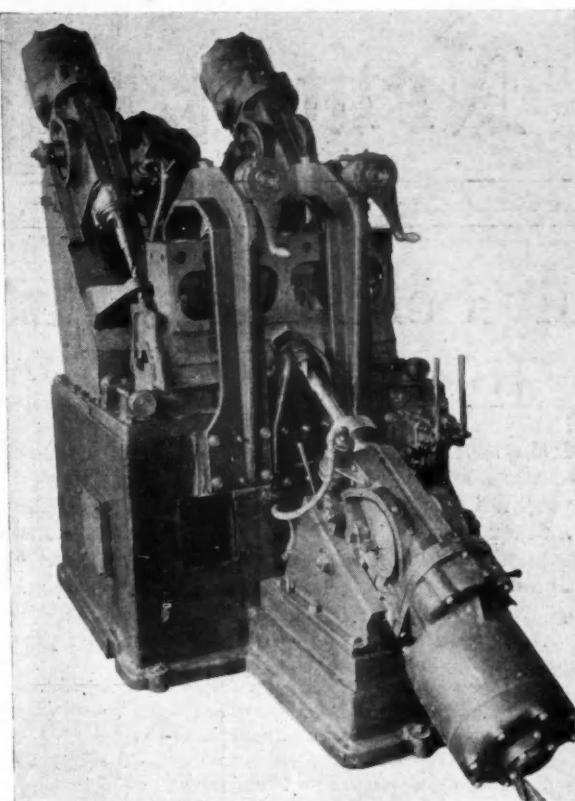


Fig. 2—Another view of the Millholland units showing cylinder block in place for drilling

line and the base of the fixture is equipped with adjustable rollers which permit the cylinder blocks to be rolled in place over the locating pins and to be shoved on down the line when the operation is completed. The rollers work by means of springs which, when the hold down clamps are relieved, lift the block off the hardened wear strips of the work holding fixture and permit its being moved easily.

Combustion in Oil Engines

(Continued from page 42)

bustion chamber, Fig. 3f, utilizes the Junkers cylinder principle but operates with dished crown pistons and thus adds piston controlled air turbulence to the already swirling air.

The Ruston-Hornsby and N.A.C.A. combustion chambers, both similar in design, have provision for vigorous, piston-controlled air turbulence and one or more fuel jets. By proper coordination with an hydraulic pressure injection system, this combustion chamber has given creditable performance in an N.A.C.A. single cylinder aircraft type engine at speeds up to 2000 r.p.m.

Between the foregoing diversant types are a large number of similar high performance combustion chambers of the flat cylinder head-dished piston crown type such as shown in Figs. 3d and 3e. Among the engines employing this general type of combustion chamber are several slow speed engines, and the well-known M.A.N. and Dorner truck engines, the Packard and N.A.C.A. aircraft engines, and the Westinghouse rail car and locomotive engines.

(To be concluded next week)

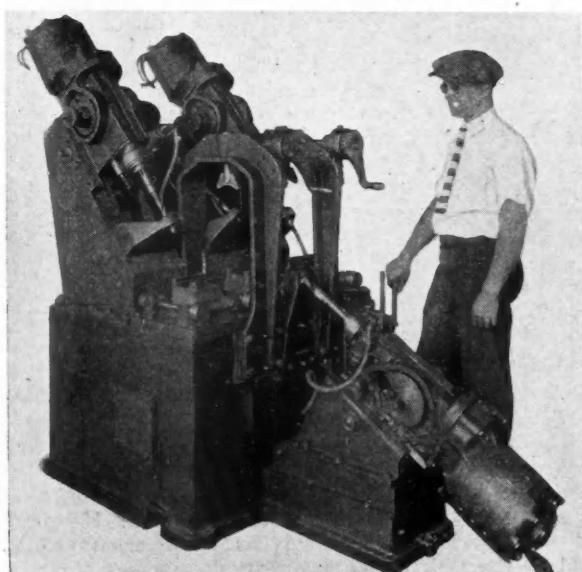


Fig. 1—General view of four-way drilling machine made up of Millholland automatic drill head units

First with
the News

Reliable,
Accurate

News of the Industry

PAGE 62

VOLUME 61

Philadelphia, Saturday, July 13, 1929

NUMBER 2

July Schedules Continue In Advance of Last Year

PHILADELPHIA, July 13—Motor car production reached a low ebb for the summer season to date in the first week of July because of the four-day holiday period. The industry resumed the second week, however, with schedules for the industry in general considerably ahead of the corresponding period of last year. Many executives who have held that the industry would experience a sharp recession in the second half of the year on account of the record business enjoyed during the first six months, have altered their opinions because of present developments.

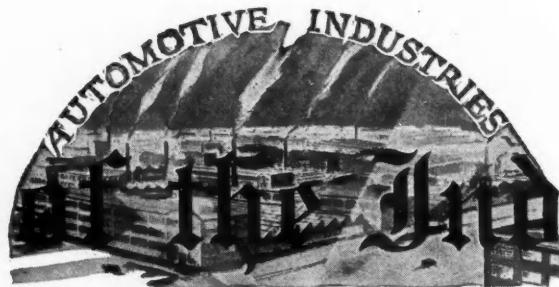
Production of cars and trucks in the United States and Canada during June was approximately 536,309, according to the National Automobile Chamber of Commerce, establishing a new record for any six months' period and making a total output of 3,380,088 for the first six months of the year. This exceeds the corresponding period of 1928 by 1,053,579 vehicles, or 45 per cent. N.A.C.C. member production for June is estimated at 321,309 cars and trucks, which is 12½ per cent under June, a year ago, and 25 per cent under May of this year. The industry's production for the month was approximately 26 per cent over June of last year, but somewhat less than May of this year.

The volume of business up to this time has generally upset predictions, especially in the low-priced field. There was a feeling that as soon as Ford reached the high rate of production which he had attained with the Model T, that it would materially affect the market of other low-priced cars, especially Chevrolet and Whippet.

In spite of Ford's tremendous business, however, which is now exceeding the best marks set by Model T production, Chevrolet and Whippet cars are also being produced at maximum capacity, and their record high production of last year is being exceeded by their activities so far this year.

Thompson Earns \$646,621

NEW YORK, July 9—Thompson Products, Inc., reports net earnings for the first five months of the current year of \$646,621 after all charges. This is equivalent to \$2.41 a share on A and B stocks and compares with \$417,208 or \$1.61 for the corresponding period last year.



Philadelphia, Saturday, July 13, 1929

New York Air Show Announced for 1930

NEW YORK, July 10—The Aeronautical Chamber of Commerce of America has announced that it will hold an aeronautical show in the Madison Square Garden, New York, during the week of May 3 to 10, 1930. This show is to be held on the recommendation of the metropolitan area dealers and distributors section of the chamber but will have the backing of the whole chamber. It is designed to show the public what is being offered in aircraft and to demonstrate the strides that have been made in aircraft development. Having the backing of the chamber, the show will number among its exhibitors many of the manufacturers as well as local distributors and dealers.

Nash Motors Earnings Gain Over First Quarter

CHICAGO, July 10—Earnings of the Nash Motors Co. recorded a substantial gain in the second quarter of the fiscal year, figures announced yesterday reveal. Net income, after all charges, for the three months ended May 31, amounted to \$6,623,329, the equivalent of \$2.42 per share, on 2,730,000 shares of capital stock. This compares with earnings of \$2,768,473, or about \$1 per share, for the same period of last year.

The second quarter earnings bring the total for the six months ended May 31 to \$10,742,199, or \$3.90 a share, on the capital stock, which compares with \$5,732,851, or \$1.97 per share, for the corresponding period of the preceding fiscal year.

June Inspections Decline

NEW YORK, July 10—The Tire & Rim Association of America, Inc., inspected and approved during the month of June, 2,184,219 rims, as compared with 2,429,453 in June a year ago. During the six months ended June 30, the association inspected and approved 14,201,962 rims, as compared with 12,974,439 for the corresponding six months' period of 1928.

Oakland Adds Body Type

PONTIAC, MICH., July 13—Addition of a brougham type body to the current line of Oakland All-American Sixes has been announced by the Oakland Motor Car Co. The new model will sell for \$1,195, and will accommodate five passengers.

Sikorsky May Join United

NEW YORK, July 10—Considerable interest has been aroused recently in financial circles by the rumor that United Aircraft & Transport Corp. was planning to secure control of the Sikorsky Aviation Corp., manufacturers of amphibian airplanes. No definite statement could be obtained from either of the companies concerned in the rumor, the local offices of United stating that they knew nothing about the possibility of purchasing Sikorsky and the officers of the latter company being unwilling to make any comment in the absence of A. C. Dickinson, president, who has been out of town for the past several days.

New Era Appoints Peabody

NEW YORK, July 10—New Era Motors, Inc., manufacturers of the Ruxton front wheel drive automobile, has announced the appointment of Fred D. Peabody, formerly with Hupp Motor Car Corp., as sales manager. J. E. Roberts, general manager of the company, stated today that the first of the production models of the new car would be ready for exhibition next week.

Willys Sells Stock to Banking Firms

Toledo and Chicago Interests Buy His Holdings in Overland

CHICAGO, July 11—Interests represented by Field, Glore & Co., Chicago investment bankers, and by George M. Jones, Toledo banker, have purchased the holdings of John N. Willys in the Willys-Overland Co., it was announced officially yesterday by the Chicago firm. The transaction is reported to have involved \$25,000,000.

The Field, Glore & Co. statement said: "Financial interests in Chicago and Toledo represented by Field, Glore & Co., and George M. Jones, president of the Ohio Savings Bank & Trust Co., Toledo, have purchased privately from John N. Willys a substantial part of his holdings of common stock in the Willys-Overland Co."

It is expected that in the near future Marshall Field and Charles F. Glore, representing the Chicago interests, will become members of the board of directors of the Willys-Overland Co.

Mr. Willys, according to Washington reports, is being considered for a high post in the foreign service, possibly the ambassadorship to France, although later reports say that he may possibly be sent as envoy to Turkey.

TOLEDO, OHIO, July 9—Directors of the Willys-Overland Co., at a meeting today declared the regular quarterly dividend of 30 cents on common shares, payable Aug. 1 to stockholders of record July 20.

Electric Auto-Lite Co.

Seeks to Buy Brown

DETROIT, July 11—It has been learned on excellent authority that an offer has been made by the Electric Auto-Lite Co., of Toledo, to purchase the John W. Brown Mfg. Co., of Columbus, Ohio, manufacturers of automobile equipment. The directors of the Brown Mfg. Co. have authorized a \$1.75 special cash dividend, payment of which will be contingent upon the merger of the two companies going through.

According to the offer, which has been made by the Electric Auto-Lite Co. to the Brown organization, two and three-quarter shares of Brown will be exchanged for one share of Auto-Lite. The Auto-Lite offer is contingent on the acceptance by two-thirds of the Brown stockholders. The Guardian Trust Co. of Detroit will act as a depositor for Brown stock and will issue negotiable deposit certificates.

British Change Rule

LONDON, June 26—A new order under the Merchandise Marks Act has just come into operation relating to ball and roller bearings. The chief points of the order are: "It shall not be lawful to import into the United Kingdom

any ball bearing or any other roller bearings or to sell or expose for sale in the United Kingdom any such ball or roller bearing which has been imported unless it bears an indication of origin. The indication of origin shall be die-stamped or otherwise impressed or etched on the visible surface of the outer ring of the bearing. Nothing in this order shall apply to any ball or roller bearing if at the time of importation it forms an integral part of another article."

Miller to Produce Airplane Engines

LOS ANGELES, CAL., July 10—Harry A. Miller, known for his work in the development of racing cars and motors, has entered the quantity production field in the construction of motors for airplanes, automobiles, and motor boats. A \$5,000,000 corporation has been formed by Mr. Miller and his associates in the new venture, who are chiefly men in the aviation industry. The company is to be known as the Miller-Schofield Co., deriving its name from Mr. Miller and George Schofield, who is associated with him.

Others interested in the new company are G. E. Morelan, Gilbert Beesmeyer and Fred Keeler, all of them executives in aviation enterprises. Production will start immediately in the present Miller plant at Los Angeles, and plans are under way for a new plant on a nine-acre site.

LOS ANGELES, CAL., July 9—Rumors connecting Harry A. Miller, builder of racing cars and developer of the front-wheel drive, with New Era Motors Corp., were set at rest here today, when it was stated at Mr. Miller's offices that he is at present connected with the Auburn Automobile Co. as a consulting engineer in the construction of the new front-drive Cord, which is designed on Miller patents.

Dodge Senior to Have Optional Transmission

DETROIT, July 10—Announcement has been made by the Dodge Brothers Division of the Chrysler Corp. that Dodge Brothers Senior Six is now available with either the standard three-speed or an internal gear four-speed transmission. The four-speed transmission, a product of the Warner Gear Co., drives direct on fourth speed and gives a reduction of 1.42 for third, 2.32 for second and 3.738 for low.

Shift is of the standard S.A.E. four-speed type, with the low speed taking the place of the customary reverse and a latchout engagement for the latter, to the left and forward.

Berliner-Joyce Elects Leach

George T. Leach, partner of A. B. Leach & Company, bankers of New York and Chicago, has been elected to the board of directors of the Berliner-Joyce Aircraft Corp. of Baltimore, Md.

Perkins Is Elected To Succeed Legge

New International Harvester President With McCormick 30 Years

CHICAGO, July 8—Herbert F. Perkins, vice-president of the International Harvester Co., has been elected president of the company to fill the place vacated by Alexander Legge, who resigned to head the new Federal Farm Board, appointed by President Hoover. Mr. Perkins entered the employ of the McCormick Harvesting Machine Co. in 1898, and has been associated with the McCormick enterprises continuously since that time. He has held a number of important executive positions, and for the past seven years has been first vice-president of the International Harvester Co., successor to the original McCormick company.

In announcing the election of Mr. Perkins, Cyrus H. McCormick, chairman of the board of the International Harvester Co., paid high tribute to Alexander Legge, whose resignation was accepted, it was stated, only to permit him to serve the country in a position for which he, among all men, seemed best fitted.

"The company is especially indebted to Mr. Legge at this juncture for his foresight and faculty in helping to build up for the company a strong organization composed of able and experienced executives," Mr. McCormick's statement said.

New Six-Cylinder Model Announced by Durant

DETROIT, July 10—Announcement has been made by Durant Motors, Inc., of the introduction of a new model, the 6-63, a six-cylinder car with a three-speed transmission, priced midway between the present 6-60 and 6-66 models. It is being offered in three body styles, a phaeton listing at \$925, a coupe priced at \$845 and a four-door sedan at \$895.

Aside from the three-speed transmission, specifications of the new model closely follow those of the next larger Durant. The wheelbase is 112 in. Benda two-shoe internal brakes and shock absorbers are standard equipment.

Grapho-Metal Buys Plant

DETROIT, July 8—Announcement was made today of the purchase last week of the plant and equipment of Detroit Replacement Service by the Grapho-Metal Packing Co. of Indianapolis. Detroit Replacement Service specializes in the manufacture of water pump parts and starting cranks.

L. F. Hanger, former president of D. R. S., will devote the major portion of his time in developing an automotive sales organization in South America. He has no connection with the present company.

New Requirements for Planes Adopted

Airworthiness Code has 38 Changes to Increase Safety and Comfort

NEW YORK, July 13—Thirty-eight changes have been made in the Department of Commerce's "Airworthiness Requirements" for planes produced in the United States, according to the Aeronautical Chamber of Commerce of America, which cooperated with the government department in drawing up these changes. These changes are designed to increase safety and comfort in the planes submitted for approved type certificates.

The Department of Commerce, among other things, will require manufacturers to demonstrate by tests the strength of all control surfaces and control systems, and the shock-absorbing qualities of landing gears. All wood members used in airplane construction must be tested to destruction, and the samples of parts which fail must be tested to determine their physical properties.

Cabin planes must have one exit for every six passengers carried instead of two as heretofore. Detailed specifications for all openings and exits are given. Requirements for the methods of mounting engines are outlined in considerably more detail than in the old regulations. Rational formulae are given for the determining of the relative efficiency of biplane wings, instead of the inaccurate curves formerly used. Methods of calculating air load and dead weight for wings which are tapered in thickness ratio have been changed to comply with the latest available aeronautic information.

Propeller clearance above ground has been raised from six to nine inches in land planes, and to 18 inches for sea-planes. Propellers must be so designed and adjusted that they will limit the engine speed at full throttle in level flight to 105 per cent of the official rated speed. Other requirements for propellers have been rewritten, and the department will no longer accept new propellers upon an affidavit of 150 hours of flight service. A paragraph has been added, devoted to the construction of gliders.

Tracy Sees Prosperity for Remaining Months

DETROIT, July 8—Healthy prosperity for the automotive industry during the balance of the year is anticipated by W. R. Tracy, vice-president in charge of sales of the Oakland Motor Car Co., Pontiac, Mich., who stated recently that from a mid-year perspective the outlook for the next six months of 1929 promised a substantial gain over the same period last year.

From information supplied him by several hundred field representatives quartered in all sections of the United

States, Mr. Tracy declared that conditions are generally more stabilized than in 1928, when a new high output record was set in the automobile industry, and that people everywhere seem content with the present order of things and confident that America's unprecedented prosperity will be maintained for an indefinite period.

Studebaker Sales Show Slight Gain

DETROIT, July 8—Sales of 31,168 cars in the second quarter, compared with 30,028 in the first quarter, were announced today by Paul G. Hoffman, vice-president of the Studebaker Corp. Pierce-Arrow sales for June were 1472 cars compared with 634 a year ago, an increase of 132 per cent. This brings Pierce-Arrow sales for the half year up to 6025 passenger cars alone, compared with 2729 in the first six months of last year, and 5491 in the entire year 1928. In addition to selling more cars in six months than were sold in the twelve months of 1928, Pierce-Arrow had on hand July 1 unfilled orders for 1329 cars.

Studebaker President and Commander sales were 40,664 cars for the first six months of 1929 as compared with 28,565 cars during the corresponding period of 1928, or an increase of 42 per cent, although the total of 61,196 Studebaker cars for the first six months of 1929 is less than the corresponding figure of 75,284 cars for 1928.

The decline in sales volume has been primarily in the Erskine, which has been sold on an extremely small margin of profit to the corporation, and in the Dictator. Six-cylinder and eight-cylinder lines of new Dictators are being introduced and promise a large increase in Studebaker unit volume.

Charles J. Woodall

DETROIT, July 8—Charles J. Woodall, 63 years old, one of the original stockholders in the Ford Motor Co., died at his home on Lake Shore road, six miles from Mt. Clemens, following a day's illness. He was one of the pioneers in the early, uncertain days of the automobile industry in Detroit. In 1901 he invested his savings in the Ford Motor Co. He held this stock until 1907, when, together with the late A. Y. Malcomson, he sold his interest.

Following the sale of his Ford stock, Woodall started his own automobile plant, the Neilsen Motorcar Co. He continued in business for three years, until the company was dissolved. In 1910 he retired.

Hudson Enters 21st Year

DETROIT, July 8—The Hudson Motor Car Company celebrated today the twentieth anniversary of the shipping of the first Hudson car, which took place July 8, 1909. The 1,779,360th car which the company has manufactured in its two decades has just come off the assembly line.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, July 10—During the first half of 1929 most lines of business made exceptionally fine records, while several registered new highs for all time. There was some seasonal recession during June, but trade and industrial activity in that month was very satisfactory and well above that of a year ago. At present, the automobile, implement, and hardware industries are making the most creditable showing, while production of iron and steel continues on a large scale.

COMMERCIAL FAILURES

Commercial failures during June, according to R. G. Dun and Company, totaled 1767, as against 1897 during May. Liabilities involved in the June failures amounted to \$31,374,761, as compared with \$41,215,865 for May and \$29,827,073 for the corresponding month last year.

FREIGHT CAR LOADINGS

Railway freight loadings for the week ended June 22 totaled 1,069,046 cars, which marks a decrease of 43 cars below those in the preceding week and an increase of 81,686 cars over those in the corresponding week last year. Railway freight loadings for the first 25 weeks of this year totaled 24,501,214 cars, a new high record for all time, as compared with 23,485,074 cars in the corresponding period last year and 24,499,602 cars in the corresponding period in 1927.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended July 6 stood at 98.2, as against 97.7 the week before and 97.6 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended July 3 were 24 per cent above those in the corresponding week last year.

STOCK MARKET

The stock market last week continued its advance. With the exception of a slight reaction on Friday, brought about by large-scale profit taking, the market was buoyant throughout the week; and the "New York Times" index of security prices again reached a new high for all time. Call money ranged from 6 to 15 per cent.

FEDERAL RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended July 3 showed increases of \$108,300,000 in holdings of discounted bills and of \$36,400,000 in member bank reserve deposits, while there were decreases of \$8,900,000 in holdings of bills bought in the open market and of \$8,100,000 in holdings of Government securities. The Reserve ratio on July 3 was 72.9 per cent, as against 75.3 per cent a week earlier.

Automotive Steel in Light Demand

Reduction of Backlogs Continues as Principal Mill Activity

NEW YORK, July 11—While the volume of new business emanating from automotive consumers is decidedly light, shipments against old specifications make up, in the aggregate, a fairly broad movement of steel to automotive plants. According to orthodox market notions, unless the decline in fresh automotive commitments should prove but a temporary lull in buying, the transformation from a sellers' to a buyers' market, sooner or later, must bring on another period when prices will be subjected to a test. In some departments of the market, even at this early stage of the change from high pressure demand to more normal conditions, producers are doubling their sales efforts, and as usual when steel is sold instead of bought, there is more or less hinting at price concessions being in the offing. In some of the outstanding descriptions of steel, such as full-finished automobile sheets, it must be noted, however, that sellers and buyers have seen eye to eye in the matter of prices for some time. There would have been ample opportunity to lift prices for a time during the recent bulge in demand, but leading producers held prices steady even when semi-finished material was difficult to obtain. Representative buyers are exerting no pressure on prices, at this time, being apparently well satisfied with the levels which prevail. In some lines, especially in strip steel, considerable capacity will be added through new plants and plant extensions, and as a result, competition among producers is growing keener and keener from day to day, but on the other hand automotive demand for strip steel has undergone such marked expansion of late that the added capacity was a necessity if peak demand is to be taken care of satisfactorily. For the time being, strip steel prices remain quatably unaltered, but some mills are disposed to book at minimum prices business that in point of tonnage and specifications would have been considered unattractive in May. Non-integrated rollers are in no hurry to close for their third-quarter requirements of semi-finished steel. Instead of an advance in prices which was spoken of a month ago, many buyers of semi-finished steel now look for easier market conditions.

Pig Iron—The market is quiet. There is no quotable change in prices, but representative purchases are so few and far between that the market is largely a retail affair for the time being.

Aluminum—Routine conditions prevail in both virgin and remelted metal. Prices remain unaltered and there are no fresh developments to be noted.

Copper—Producers believe that many of the consumers are reaching the end of their

Driver Reactions Studied in Test

BOSTON, July 8—Tests made by the Massachusetts motor vehicle department that the motor truck driver is a safer and less irresponsible pilot than the average driver of a passenger car. The Massachusetts study revealed that the frequently maligned truck driver reacts nearly 100 per cent faster in emergencies than the ordinary passenger car pilot, and can be credited with a better safety record in spite of the fact that their trucks cover more mileage and travel in congested areas where accident risks are much more numerous.

supplies, and will be compelled to enter the market during the second half of this month. A rather easy tone prevails in what there is of an "outside" market, resellers apparently having some metal which they will let go at a fraction under the price named by producers.

Tin—A steady tone features the market. While buying is not very spirited, futures have developed a rather strong undertone.

Lead—Following downward revision to the extent of \$2 per ton in the leading interest's contract price, the market turned steady and quiet.

Zinc—Some of the producers are holding out for slightly better prices than those afforded by the current market, and refrain from pushing sales until the cheaper offerings are out of the way.

N.A.P.A. Fall Convention Will be Held in Detroit

DETROIT, July 8—The annual fall convention of National Automotive Parts Assn. will be held in Detroit, November 6, 7 and 8, according to an announcement issued today. Exhibits and all general sessions will be held at Hotel Statler. Arrangements are being made to entertain about three hundred more associate jobbers than attended the meet last year.

Detailed arrangements for this year's convention are being handled by the following committee: H. A. Mitchell, Continental Motors Corp.; Lawson Henry, Asbestos Textile Co.; E. J. Felt, the Moss-Chase Co., Buffalo; R. W. Boozer, Central Motor Parts, Indianapolis; F. M. Harrington, merchandising director N.A.P.A.; Chas. N. Davis, secretary, N.A.P.A.

Goodrich Earnings Rise

NEW YORK, July 9—B. F. Goodrich Co. will show net earnings of more than \$5,000,000 for the first six months of the current year after all charges, according to financial circles. This compares with earnings for the whole year of 1928 of \$3,513,023 and for the first half of 1928 of \$1,574,889.

Chapin, in Europe, Discusses Problems

Meets European Automotive Leaders and Goes to Amsterdam

PARIS, July 1—After a few days in Paris, Roy D. Chapin, chairman of the board of the Hudson Motor Car Co., left for Amsterdam to attend the meeting of the Highway Transport Committee of the International Chamber of Commerce, of which he is chairman.

While in France, Mr. Chapin was, for a few days, the guest of Louis Renault, at the latter's country home. He attended a meeting of the International Road Congress Committee to arrange for the International Road Congress to be held in the United States in 1930, and met with the officials of the American Automobile Club of Europe.

Following a conversation with Senator Crespi, president of the Royal Automobile Club, regarding an attempt on the part of the club to discriminate against purchasers of American automobiles, Mr. Chapin declined to make a formal statement but gave it as his opinion that the Italians, exporting about 50 per cent of their automobile production, would realize the folly of attempting a boycott of American cars.

Lynch Elected by A. S. T. M.

ATLANTIC CITY, N. J., July 8—At the recent annual meeting of the American Society for Testing Materials, at Atlantic City, T. D. Lynch, consulting metallurgical engineer of the Westinghouse Electric and Manufacturing Company, was elected president for the coming year; F. O. Clements, technical director of the General Motors Research Laboratory, vice-president; and C. L. Warwick was reelected secretary-treasurer. Four new members were elected to the executive committee, as follows: G. B. Haven, professor of machine design at Massachusetts Institute of Technology; C. R. Hook, vice-president and general manager of American Rolling Mills Company; H. E. Smith, engineer of materials, New York Central Railroad, and G. E. Warren, assistant general manager, Portland Cement Assn.

Stock Issue Recommended

DETROIT, July 8—Directors of the L. A. Young Spring & Wire Corp. have voted to increase the authorized no par common stock from 350,000 shares to 1,000,000 shares, and after such an increase has become effective, to pay a stock dividend of 25 per cent. Stockholders of the company will vote on the proposal at a special meeting Aug. 1.

Franklin Adds Model

SYRACUSE, N. Y., July 10—A four-passenger speedster model, with a four-speed transmission, and a custom body by Dietrich, is announced by the Franklin Automobile Co.

World Highway Transportation Needs Presented at Amsterdam by Chapin

NEW YORK, July 11—Roy D. Chapin, chairman of the board of the Hudson Motor Car Co., delivered a paper on "World Highway Transportation" before the International Chamber of Commerce meeting at Amsterdam, Holland, July 9, according to a cable received by the National Automobile Chamber of Commerce. Extracts from Mr. Chapin's address are printed below.

In the six years that have intervened since highway transportation was first discussed by the International Chamber of Commerce at Rome, the world has witnessed an unparalleled expansion in the use of motor vehicles as an agency of communication. Remote regions inaccessible for centuries have been quickened to new social and industrial life. Waste spaces have been made the routes for trade and travel. Older transportation agencies have found a new ally, and business a new servant in the day's work of providing transportation facilities for the movement of persons and the distribution of goods.

All that has been accomplished, however, is but a beginning. We know now that as roads are built they open the way to employment and production. Out of these come wealth and new standards of living.

In fact it is not too much to say that no community and no nation can afford to be without these modern means of transportation.

No full appreciation of the fundamental influences which has been exerted by motor vehicle use can be gath-

ered from statistics alone, yet without a background of fact it is difficult to obtain a true perspective of the vista before us.

Realizing this, your Highway Transport Committee undertook a year ago to begin a sorely-needed survey of the facts of motor transportation. While the results are necessarily still far from complete, perhaps inaccurate as to some of their details.

On Jan. 1, 1928, there were 29,151,193 motor vehicles in the world and while the United States of America still had 79 per cent of the total, each year shows an acceleration of the growth elsewhere.

More significant perhaps are the reports of road distances because without the facilities for their use, modern highway units can not be used efficiently. There are 10,622,937 kilometers of road in the world and the reports received from 83 countries of the world show that the total road construction and maintenance program in those countries for 1927 was close to \$900,000,000. If the program of the United States is added to this, the total reaches almost \$2,300,000,000.

As motor transportation grows, we return again and again to the problem of highway finance as a subject which cannot be turned aside. The amounts involved make this question one of major consequence to government authorities everywhere and as of equal importance is administration of these funds in order that the public may get the largest possible returns from the expenditures.

year and sales of imported cars were well maintained, according to the report.

Greenfield Appoints Soper

GREENFIELD, MASS., July 10—Harry Soper, formerly a vice-president of the Celluloid Corp., Newark, N. J., has been appointed a vice-president of the Greenfield Tap & Die Corp., according to an announcement made here today.

Guide Produces 440,864

ANDERSON, IND., July 9—June production at the Guide lamp plant here set a new record when 440,864 automobile lamps were shipped. Since Jan. 1, 2,727,000 lamps have been turned out at the factory.

Martin-Parry Reports Profit

NEW YORK, July 10—Martin-Parry Corporation reports a net profit for the quarter ended May 31, after all charges, of \$8,891. This is equivalent to 7 cents a share on outstanding stock and compares with profits for the corresponding quarter of 1928 of \$26,705

before Federal taxes. For the nine months ended May 31, the company reports a net loss of \$81,975, comparing with a net loss for the corresponding period a year ago of \$216,097.

Stutz Prices Lower on New Series Cars

Blackhawk Included in Reduction; Several Refinements Announced

INDIANAPOLIS, IND., July 8—The Stutz Motor Car Corp. has announced, that as of July 1, prices on the new series of Stutz and Blackhawk cars will be reduced so that the base price on the new series Stutz will be \$2,775, and \$1,995 on the companion Blackhawk car. Reductions range from a maximum of \$700 on the Stutz to a maximum of \$400 on the Blackhawk.

A number of refinements have been incorporated in the new series. A visor adjustable from inside, increased head room, positive control radiator shutters, a new instrument panel, automotive positive set windshield wipers, more resilient springs, and increased braking area are included in the Stutz. Engine refinements include an additional oil-wiping piston ring.

New prices are as follows: Blackhawk 5-passenger coupe \$1,995, chassis \$1,900, Stutz 5-passenger sedan \$2,995, Stutz 5-passenger coupe \$2,775, Stutz 2-passenger coupe \$2,995, Stutz 2-passenger speedster \$3,175, Stutz 4-passenger speedster with tonneau cowl \$3,675, cabriolet \$3,350, chassis \$2,695.

Czech Production Expands

WASHINGTON, July 11—While automobile production continues to expand in Czechoslovakia, reports received by the Commerce Department this week indicate that the supply will overtake the demand.

Budd Gets Wheel Order

PHILADELPHIA, July 10—The Budd Wheel Co. has announced an order for 725 Budd dual disk wheels for pneumatic tires from the Philadelphia Rapid Transit Co.

Equipment Makers to Meet

NEW YORK, July 8—Shop equipment manufacturing members of the Motor and Equipment Association, and their southern salesmen, will meet at Lookout Mountain Hotel, Chattanooga, Tenn., on July 24 to hold a conference similar to the one recently held in Detroit, according to announcement just made by the M.E.A. A similar meeting will be held at the Astor Hotel, in New York, on July 29 for members and their eastern salesmen, and it is probable that another will be held in Kansas City some time in the fall. The date for this last meeting, which will be held for the benefit of western salesmen, has not yet been determined.

British Sales Good

WASHINGTON, July 11—June automotive sales in the United Kingdom were assisted by good weather conditions but uncertainty is felt concerning future import duties which are expected to follow formation of the labor government, according to a report received this week from London by the Department of Commerce. Imports of commercial vehicle chassis showed an increase this

Automobile Tariff Continuance Sought

Automotive Leaders Ask Re- tention of Cars and Trucks on Dutiable List

WASHINGTON, July 11—Retention of automobiles on the dutiable list at a nominal rate of 10 per cent, with a countervailing duty, instead of the present duty of 25 per cent ad valorem, was recommended by Alvan Macauley, president of the National Automobile Chamber of Commerce and of the Packard Motor Car Co., in testifying, by invitation before the Subcommittee on Metals of the Senate Finance Committee, which is conducting hearings on the Hawley Tariff Bill. His statement was indorsed by Alfred P. Sloan, Jr., president of the General Motors Corp., in testifying before the Subcommittee.

Free trade is favored by the Ford Motor Co., insofar as it is concerned, the committee was told by R. I. Roberge, who said he was appearing for Edsel Ford, president of the Ford Motor Co.

Continuance of the 25 per cent ad valorem duty, together with countervailing duty, was advocated before the Subcommittee by Walter C. White, president of the White Motor Co.

"If the question had been raised to us one or two years ago," Mr. Macauley read from his prepared statement, "I think I am safe in saying that virtually a unanimous answer would have been that we required no tariff for passenger cars. But today, in the event of the removal of the motor vehicle from the dutiable list, with changing economic conditions abroad, the result might be the invasion of the American market by foreign-made cars."

H. H. Rice, chairman of the legislative committee of the National Automobile Chamber of Commerce, in testifying before the Subcommittee, urged a modification of the present tariff regulation so that American cars, manufactured in America, can be purchased abroad by Americans, and may be brought back to America without paying the full import duty.

Other automotive officials attending the hearing included: Alfred L. Reeves, general manager of the National Automobile Chamber of Commerce; T. R. Dahl, of the Motor Truck Committee, N. A. C. C.; and Pyke Johnson, of the Washington office, N. A. C. C.

Besides Senator Reed, other members of the Subcommittee were: Senators James Couzens, Republican, Mich.; William H. King, Dem., Utah; and Alben W. Barkley, Dem., Kentucky.

Rubber Exports Rise

WASHINGTON, July 11—Exports of rubber products from the United States during May reached a value of \$6,788,615, or \$801,883 in excess of shipments during May, 1928, the Department of Commerce announced this week. Exports

of automotive rubber goods accounted for 56 per cent of the total value during May, the smaller-sized automobile casings being the leading item. Exports of truck and bus casings not only increased in volume but manifested a gain in unit values from \$28.53 to \$28.72.

Aeronautical Chamber Membership Increases

NEW YORK, July 10—An increase in membership from 244 early in 1928 to 808 on July 1, 1929, was reported at the semi-annual meeting of the Aeronautical Chamber of Commerce of America, held at its headquarters here yesterday. This growth was attributed partially to the reorganization of the Chamber last year, and the establishment of geographical divisions and the further segregation of members into sections according to specialized interests.

Among the activities undertaken during the past year by the Chamber has been the preparation of a directory of sources of supplies. The adoption of the new air worthiness requirements by the Department of Commerce, was pointed out as another forward step taken during the past six months. Work toward establishing standards in flying schools, the presentation of a preliminary report on uniform accounting and the establishment of an export department, are other developments of the year reported by the Chamber.

Dwight G. M. Wallick

PHILADELPHIA, July 2—Dwight G. M. Wallick, a representative of the Ford Motor Co., at Philadelphia, died in Washington, June 29, while returning from a vacation. Mr. Wallick had been with the Ford Motor Co. since 1921, and previous to that time had represented the Oliver Chilled Plow Works. He specialized in tractor and truck sales for agricultural purposes, and was widely known in a territory covering eastern Pennsylvania, southern New Jersey, Delaware and Maryland.

Plan to Produce Plane

NEW YORK, July 10—Emsco Aircraft Corp. of Downey, California, has manufactured a cabin monoplane which it plans to produce on a commercial basis. This company, which was organized as the E. M. Smith Co. in 1911, to manufacture a number of products, such as transmission belting and hydraulic brake lining, plans to go into production on a number of other types of planes, including twin-motored amphibians and two-place training planes.

Kokomo Discontinues Tires

KOKOMO, IND., July 9—Announcement has been made at the plant of the Kokomo Rubber Co. here of the discontinuance of tire manufacture, the new factory now devoting itself to various automobile accessories in the rubber line. There are about 250 workers.

Automotive Freight Figures Announced

Factory Shipments List Nearly Two Hundred Million in 1928

NEW YORK, July 9—In 1928 railroads received \$193,798,936 freight revenue from automotive sources, according to figures disclosing freight revenues of the rail carriers from shipments of automobiles, trucks, parts and tires, as taken from statistical reports of the Interstate Commerce Commission, released by J. S. Marvin, general traffic manager, National Automobile Chamber of Commerce. Of this, Eastern roads received \$93,747,940; Southern roads \$16,227,942 and Western roads \$83,823,054.

In the East the New York Central lines and Michigan Central led in revenue from the shipments, with \$27,761,021, followed by the Pennsylvania Railroad with \$9,357,680, Wabash and Ann Arbor \$8,178,946, and the Pere Marquette with \$5,198,806.

In the South the Illinois Central and affiliated lines received \$5,013,013; Southern Railway System \$4,901,775, and Louisville & Nashville and Atlantic Coast Line \$3,371,380.

Transcontinental Lines lead in the West, the Union Pacific group showing \$12,517,053, the Pacific Lines of the Southern Pacific Company and its affiliated carrier, Texas and New Orleans, \$11,405,808, and the Santa Fe System \$8,552,807.

States May License Pilots

WASHINGTON, July 10—A nationwide state licensing system for airplanes and pilots, similar to that in vogue for automobiles and drivers, was recommended this week by the Aeronautics division of the U. S. Department of Commerce. Such licensing, the department believes, will aid the cause of aviation by prohibiting unskilled pilots from using obsolete planes in intrastate traffic. Most accidents are ascribed to unlicensed operation of defective planes.

Bohn Reports Sales

NEW YORK, July 9—Bohn Aluminum & Brass Corp. reports net sales for the first six months of the current year as upwards of \$18,000,000. Earnings are expected to show an increase over the first half of 1928 when they amounted to \$1,644,089 or \$4.70 a share on outstanding stock.

Boston Show Date Changed

BOSTON, July 9—At a meeting of the board of directors of the Boston Automobile Dealers Association, held here this week, it was voted to hold the annual automotive show during the week of January 18 to 25, instead of the usual time in March.

Men of the Industry and What They Are Doing

Ford Favors Power Trust Says Recent Interview

Henry Ford, in a recent interview, declared that he favored the idea of a single monopolistic power combine as the best means of bringing the advantages of electricity to the whole nation.

"People talk about a 'power trust,'" Mr. Ford said. "I only wish that there actually were a power trust, a central directing organization for the development and use of every power source in the country, tied into one national power system for the service of the whole country; that is, welded into one operating and business unit. It has got to come as the one necessary and economic method of power production."

"All talk about exploitation of industrial combines for private profit is of no importance, he asserted, the important thing being what the nation as a whole gets as a result of the economic and technical advantages of these combines."

Hanson-Van Winkle Appoints

Hanson - Van Winkle - Munning Co., Matawan, N. J., manufacturers of electroplating and polishing equipment and supplies, has announced the following new appointments in its personnel: H. R. Smallman, for the past three years assistant to the sales manager, has been appointed manager of the Chicago office; H. M. Cherry, for the past seven years representing the company in Michigan, has been appointed manager of the Detroit office, and Louis M. Hague, representing the company in western Pennsylvania for the past two years, has been appointed manager of the Pittsburgh-Cleveland office at Pittsburgh with territory covering Ohio, western Pennsylvania and West Virginia.

Jubilee Committee Appointed

Among the men prominent in the automotive industry who have accepted membership on the general committee in charge of Light's Golden Jubilee are: Walter P. Chrysler, Harvey S. Firestone, and Henry Ford.

Rose Leaves American Chain

J. H. Rose, sales manager of the window-lift division of the American Chain Co., has resigned from the company and will establish himself as a manufacturers' sales representative with offices in New York.

Consolidated Elects Hambleton

Consolidated Instrument Co. of America, Inc., has elected General T. Edward Hambleton, president of Hambleton & Co., as a director, to succeed the late Col. John A. Hambleton, his brother.



C. D. Sterling

Former assistant secretary and accounting manager of the Hudson Motor Car Co., whose appointment as purchasing agent of the company was announced in Automotive Industries last week

Long To Address Chamber

John C. Long, manager of the information bureau of the National Automobile Chamber of Commerce, will speak on association literature at the National School of the United States Chamber of Commerce at Northwestern University, Chicago, on August 4. Mr. Long, who is at present taking a vacation in Europe, will be back in this country about August 1.

Bauer Leaves for South America

George F. Bauer, Export Manager of the National Automobile Chamber of Commerce, sailed on July 9 for an extended trip down the west coast of South America. He will visit Ecuador, Peru, Bolivia, Chile, Argentine, Uruguay and Brazil, as part of the N.A.C.C. program of internationalizing motor transport.

Stevenson Joins White Co.

Perry J. Stevenson, of Chicago, has resigned his position as Department of Commerce foreign trade expert, to accept a position as manager of the South African Division of the White Motor Co., it was announced this week. Stevenson has been in the government service 15 years.

Olds Appoints Ackerman

The appointment of Frank J. Ackerman as regional manager of the Southeast region for Oldsmobile and Viking is announced by D. S. Eddins, vice-president and general sales manager of the Olds Motor Works. Mr. Ackerman will maintain headquarters in Atlanta, Ga.

Timken Sales & Service Announces Promotions

Several changes have been announced in the organization of the Timken Roller Bearing Service and Sales Co. R. C. Brower has been promoted from general manager of that company to assistant secretary and assistant treasurer of the Timken Roller Bearing Co. W. H. Richardson, formerly manager of the New York branch of the service and sales company, has been made its general manager, with headquarters at Canton, Ohio.

E. H. Austin, manager of the Kansas City branch, becomes manager of the New York branch, and L. J. Halderman, manager of the Atlanta, Ga., branch, has been made manager at Kansas City. Parker T. Ancarrow, manager of the Richmond, Va., branch, becomes manager at Atlanta, and Stewart B. Ancarrow, manager of the Richmond branch.

Convention Committee Named

The National Industrial Advertisers Association, which will hold a convention in Cincinnati, Sept. 30 to Oct. 2, has appointed the following committee in charge of convention arrangements: Jesse R. Harlan, chairman, Steubing-Cowan Co., Cincinnati; Sherman Perry, American Rolling Mill Co., Middletown, Ohio, program; C. Kenneth Magers, Union Gas & Electric Co., Cincinnati, publicity; Samuel Glueck, Key Advertising Co., Cincinnati, exhibits; R. W. Bohnett, Bohnett Co., Cincinnati, entertainment; Frederick B. Heitkamp, Cincinnati Milling Machine Co., attendance; George Gauff, Manufacturers Record, registration; William Heilig, William Powell Co., Cincinnati, transportation.

AC Promotes Doyle

W. T. Doyle has been appointed territory representative for the AC Spark Plug Company and will cover eastern Pennsylvania and New York State, according to J. C. Hines, AC district sales manager. Mr. Doyle formerly represented AC in New York State as a dealer salesman.

Murray Corp. Elects Hill

L. Clayton Hill, formerly assistant sales manager of the Murray Corp. of America, has been made vice-president and general manager of Dietrich, Inc., the custom body division of the Murray organization.

Hexcel Appoints Gumersbach

The Hexcel Radiator Co. has announced the appointment of H. F. Gumersbach as sales engineer. Mr. Gumersbach was with the Perfex Corp. for four years and previous to that was associated with the A. O. Smith Corp.

Ex-Cell-O Corp. to Offer Stock

Company Sells 70 Per Cent of Output to Aviation Industry

DETROIT, July 8—An offering of 40,000 shares of no par common stock of the Ex-Cell-O Aircraft & Tool Corp. will be made within a few days by Baker, Simonds & Co. The Ex-Cell-O company is one of the largest manufacturers of airplane engine and Diesel engine parts in the country. Over 70 per cent of the company's output goes to the aviation industry.

The Ex-Cell-O Aircraft & Tool Corp. was originally organized in 1919. Its growth in the first few years was slow, but in the last three years the rapidly increasing aircraft business has caused an almost continuous expansion in manufacturing facilities. The present plant, located in Detroit, was completed last September and more space is now needed. The financing will provide funds for increasing the size of the plant and facilitate stepping up production on present lines, and the manufacture of several new products.

The earnings of the company have increased since 1926. For the first five months of this year, net profits after all charges and provision for Federal income taxes amounted to \$208,859.49, equal to over \$1 per share on the 200,000 shares of no par common stock outstanding. Sales for the first five months of the year increased more than 270 per cent over sales in the same five months of 1928. Dividends are to be at the rate of \$1.20 annually payable quarterly January, April, July and Oct. 1, to stockholders of record on the 15th of the preceding month.

Bantam Ball Bearing Co. to Concentrate Holdings

SOUTH BEND, IND., July 8—The Bantam Ball Bearing Co. of Connecticut, at a stockholders' meeting held July 1, decided to dissolve the Connecticut company, sell the plant at Bantam, Conn., and concentrate manufacturing efforts at the Indiana company plant, located at South Bend, it has been announced.

Shipments and orders of the company for the first half of the year were double those of any previous six months since 1922, according to the statement. S. M. Albertson, formerly of the Central Specialty Co., Detroit, has joined the Bantam company as contact engineer.

To Add Lincoln Salon

PHILADELPHIA, July 8—A factory-owned permanent exhibit of Lincoln automobiles is being arranged in the showroom of the old Ford assembly plant here and will be officially opened about Sept. 1, according to Ford officials. All stock models of Lincoln

cars will be shown, and as many custom body types as space will permit. J. L. Miller will be in charge of the exhibit, which will be similar to other Lincoln salons in New York, Chicago and Detroit.

Ford Motor Co. Produced 177,419 Units in June

DETROIT, July 6—A total of 1,065,630 Model A cars and trucks were built by the Ford Motor Co. during the first six months of this year, officials of the company said today. A new high record in domestic production for the month of June was reached, with a total of 177,419 units, the former high record for the month being 176,729 Model T cars and trucks, in 1925.

On June 26, of this year, the high daily production mark in the history of the company was reached, with the production of 9100 Model A cars and trucks, this figure exceeding by 500 the old high daily record for Model T. A large number of dealers' orders are still unfilled, officials of the company said, and an effort is being made to build up production volume in Dearborn and the various assembly plants to meet this demand.

Lansing Stamping Co. Has Profitable Half

DETROIT, July 8—Business at the Lansing Stamping Co., Lansing, Mich., for the first six months in 1929 has been the most profitable in the history of the company and the sales have nearly doubled those of any other six months, George Conway, manager, told the board of directors at a meeting recently. The regular 2½ per cent quarterly dividend was declared.

The Lansing Stamping Co. is just completing a \$100,000 expansion program which includes a new building and equipment. This expansion will double the present capacity of the company, and was made necessary by the steady increase in business. The company has a diversified field for its products, manufacturing automotive, agricultural, mining, railroad, oil field and power equipment and household appliances.

Weatherproof Takes Plant

CORUNNA, MICH., July 8—The Weatherproof Body Corp., subsidiary of Allied Motor Industries, Inc., recently took possession of the plant of the Field Body Corp., of Owosso, Mich. The Field plant will add 200,000 sq. ft. of working space to the 130,000 now in operation at the Corunna plant, officials of the company announced, and will give employment, when in full operation, to between 500 and 1000 additional men.

Van Sicklen Gets Chrysler Order

ELGIN, ILL., July 8—The Van Sicklen Corp. has announced the closing of a contract with the Chrysler Corp., under which the former company will supply approximately 28,000 vanity and smoking sets a month for use in Chrysler, De Soto and Dodge cars.

Financial Notes

United Aircraft & Transport Corp. reports net profits for the first five months at \$3,327,414, its best five months' showing. Unfilled orders of the equipment subsidiaries are running at a high level and at the end of the period approximated \$10,000,000. During the last 30 days, the report said, additional business totaling almost \$6,000,000 was received, including contracts for several Army and Navy planes. Volume of business of the Pratt & Whitney Aircraft Co. unit reached a new peak in June.

Edward G. Budd Mfg. Co. directors have ordered the payment on August 1 of all back and current dividends on the preferred stock, amounting to \$8.75 per share, to stockholders of record July 15. The directors also declared the regular dividend of 25 cents per share payable August 1 to common stockholders of record July 15 and an extra dividend of 25 cents. Of the preferred dividend, \$1.75 is for current dividend to August 1 and \$7.00 for back dividends.

National Standard Company net earnings for May, 1929, after all charges including taxes, are reported as \$79,334 and for the eight months ended May 31, 1929, as \$489,546, equal to \$3.26 per share of common stock for the period as compared with \$321,292 for the corresponding period of the previous year, an increase of 52.37 per cent.

Allis-Chalmers Mfg. Co. has declared a quarterly dividend of \$1.75, payable Aug. 15 to stockholders of record July 24.

Hercules Motor Corp. to Increase Capacity

CANTON, OHIO, July 8—Announcement is made by officials of the Hercules Motor Corp., manufacturers of internal combustion engines, of an expansion program which is expected to increase its present capacity by approximately 50 and 60 per cent. Approximately 600 additional workmen will be given employment when the building program is completed.

Work will be started soon on the construction of three new buildings, which will add 65,000 sq. ft. of floor space to the plant's present facilities. The new buildings and the necessary equipment will cost about \$500,000 according to officials of the company.

Cottonpicker in Production

ST. LOUIS, July 8—C. W. Burst, president of Moon Motor Car Co., announced today that manufacture by the American Cottonpicker Corp. of a mechanical Cottonpicker has been started and the first units will be ready for delivery Aug. 1, as scheduled.

To Form Holding Company

NEW YORK, July 8—Preliminary plans have been made for the formation of Anglo-American Shares, Inc., as an aviation holding company, which will own shares of Handley-Paige, Ltd., A. V. Roe & Co., Ltd., Rolls-Royce Co., Ltd., and other British aeronautical enterprises for American investors.

Ford Plane Manufacturing Operations to be Concentrated in Single Factory

DETROIT, July 8—The plans of the Ford Motor Co. for the enlargement of its airplane plant, including an increase of floor space of 155 per cent and providing for the production of one trimotored, all-metal air transport a day, as announced recently in *Automotive Industries*, call for the concentration of all airplane manufacturing operations in the single factory at Dearborn. When completed, the factory will be 640 by 253 ft. At present the factory is 500 ft. in length.

Provision will be made for the production at Dearborn of parts now being made in the Rouge plant of the Ford Motor Co., while facilities for the finishing and trimming of the cabin interiors of the transports will be so enlarged that 12 airplanes may be handled on the trim line at the same time.

Throughout the early part of the year the production schedule was three airplanes a week, but recently the rate was advanced by an additional airplane weekly. Ford officials have stated that, even with this increase, orders on hand could not be met before September.

Architecturally, the plant additions will be of the style dictated by the airplane. They will conform in general appearance to the hangars and to the Ford experimental laboratories in the immediate vicinity of the airplane factory, being long and low so as to constitute no interference for incoming or departing airplanes at the airport and

no barrier to the wide visibility required for flying.

Building plans call for the erection behind the present factory of a unit duplicating the present one in size and immediately connected with it so as to double the floor space. In addition, on the north end the building will be extended to within about 90 ft. of Airport Drive. On the north end of the present plant a mezzanine floor will be built to extend southward a distance of six bays.

The exterior of the new building will be of the same materials as were used in the present structure, Bedford limestone and fire-clay brick, with steel sash and doors and cement tiled roof. An entrance at the northwest corner, convenient to the intersection of Airport Drive and Oakwood Boulevard, will admit to the general offices, the accounting, employment and stock departments, the offices of the superintendent and others. The mezzanine floor will be devoted to the drafting room, employees' room and other uses.

Decision to enlarge the airplane factory and pave the way for a continued increase in production is regarded as the second important move made by Ford this year in the aviation field. The first was the reduction, averaging approximately \$8,000 in the prices of the different trimotor transports built by the Stout Metal Airplane Co., the airplane manufacturing division.

French Vehicle Exports Show 21 Per Cent Gain

PARIS, June 29—French automobile exports for the first four months of 1929 are up 21 per cent compared with the corresponding period of 1928, the total being 14,756 passenger cars and 3130 trucks and tractors. Algeria heads the list, with 3567 passenger cars and 409 trucks, followed by Spain, Great Britain and Morocco.

Imports into France increased 9.3 per cent, the total being 2875 passenger cars and 101 trucks and tractors. Italy heads the list with 1454 motor vehicles, most of these being Fiats, the United States coming second with 1221. The value of the American imports was four times greater than those from Italy. The number of automobiles from other countries imported into France was insignificant.

Cierva to Visit U. S.

WASHINGTON, July 11—A dispatch received by the Department of Commerce this week from Commercial Attaché Charles A. Livengood, Madrid, Spain, states that the Spanish inventor Cierva, who developed the autogiro and was awarded the Lahm prize for his contribution to air navigation, will visit the

United States this month to test two planes under construction here. Recent test flights of the autogiro were considered successful, the planes being equipped with American motors of 200-hp., air-cooled, and identical to the one used by Lindbergh in his trans-Atlantic flight, it was stated.

Flying Service Planned

WASHINGTON, July 11—One hundred airplanes for flying tuition, private hire and general commercial work will soon be placed in service by the National Flying Services, Ltd., an organization formed to stimulate interest in civil aeronautics in England, according to Ray Atherton, American charge d'affaires, at London, Captain F. E. Guest, former secretary of state for air, has been made chairman of the new organization. That the organization proposes to enter into the field on a large scale is indicated by Atherton's statement which says that a network of 23 national airports will be established, each with hangars and workshops.

Navy Orders 152 Planes

WASHINGTON, July 8—The Navy Department has announced the award of contracts for 168 engines and 152

planes at a cost of \$4,172,949 in line with its five-year aviation program. Recipients of the awards were: Consolidated Aircraft Corp., Ford Motor Co., Curtiss Aeroplane & Motor Co., Great Lakes Aircraft Corp., Glenn L. Martin Co., Berliner-Joyce Aircraft Corp., Keystone Aircraft Corp., Chance Vought Corp., Wright Aeronautical Corp. and Pratt & Whitney Aircraft Corp.

Michigan Sales Reached 131,099 for Five Months

DETROIT, July 8—Passenger car sales in Michigan for the five months of 1929 ending May 31 totaled 131,099 compared with 80,447 in corresponding period of last year. Of this number 38,421 were sold in May compared with 24,736 in May of 1928.

Ford accounted for the major portion of this gain with sales of 44,130 cars compared with 6650 in the first five months of 1928. Chevrolet also showed a gain, selling 26,149 units compared with 22,669 in the corresponding period of last year. Essex sold 12,776 compared with 8839 in the corresponding period of 1928.

Highway Delegates to Sail

WASHINGTON, July 11—The United States' official delegation to the second Pan-American Congress of Highways will sail in about two weeks for Rio de Janeiro where the Congress will be in session from Aug. 16 to 31, it was announced this week. The delegation, appointed by President Hoover in accordance with a resolution adopted by Congress, will include J. Walter Drake, Detroit, chairman; Senator Tasker L. Oddie, Nevada; Congressman Cyrenus Cole, Iowa; Thomas H. MacDonald, chief of the U. S. Bureau of Public Roads; Frank T. Sheets, chief highway engineer for Illinois; Charles M. Babcock, Minnesota commissioner of highways; H. H. Rice, Highway Education Board; and Frederick A. Reimer, president of the American Road Builders' Association.

Company Name Announced

NEW YORK, July 8—Raybestos-Manhattan, Inc., has been organized as the new company resulting from the merger of the Raybestos Co., Manhattan Rubber Mfg. Co. and U. S. Asbestos Co. Officers and complete details of financing of the new company have not yet been definitely settled. An early announcement is expected on these concluding features of the merger.

Motor Stocks Lag on Market

NEW YORK, July 8—Seven representative motor stocks gained six per cent in value during June as compared with an average gain of 12½ per cent for 100 representative stocks of various classifications, according to Frazier Jelke & Co. All classes except amusements and oils recorded gains in value during the month, according to the survey compiled by this company.



New Peerless Executives

James A. Bohannon (left) and Don P. Smith were elected president and vice-president respectively of the Peerless Motor Car Corp. following the resignation of Leon R. German, who has been president of the company during the past year

German Automobile Plants Standardizing Product

NEW YORK, July 8—"The German automobile industry, not only as to quality of production, but also as to prices, is now in a position to meet foreign competition on German soil," W. R. Vogeler, president of the Mercedes-Benz Company, Inc., stated after his return to New York from his annual inspection tour to the Daimler-Benz Aktiengesellschaft, Stuttgart-Untertuerkheim, producers of the Mercedes-Benz.

There is a noticeable trend in the German automobile industry toward thorough standardization, finally to result in a considerable cut of the number of models now on the market. Though the so-called German automobile trust will in all probability not be realized, the efficiency of the various manufacturers is strengthened by adapting the methods of American production. In spite of the automobile situation on the Continent showing a general depression, due to the heavy fluctuations of its economic standing, Daimler-Benz was successful in a comparatively good sale of its six-cylinder models and of the new eight-cylinder type "Nuerburg." At the present time the Daimler-Benz Co. is working on a new eight with an especially low chassis with marked improvements, some of them entirely new in the automotive field, the statement added.

Graham-Paige Production Sets Half-Year Record

DETROIT, July 8—Graham-Paige set a new quarterly production record in the three months ending June 30, and also completed the first six months of 1929 with a total exceeding any previous half year. In addition, the overseas and Canadian shipments for six months not only set new records, but

even exceeded the totals for all 12 months of last year. The second quarter's total production was 29,214 cars, surpassing the previous high record of 26,741, made in the third quarter of last year.

For the first half of 1929, the production total is 54,498 cars, a gain of 15,759, more than 40 per cent, over the first six months of last year. Monthly production thus has averaged over 9000 cars. The 50,000th 1929 model was built June 7. Shipments to export points in six months total 7313, exceeding by 17 per cent the 12 months' record for 1928. The latest official summary of automobile exports, all makes included, shows that Graham-Paige has risen from twelfth place to seventh this year. To Canada, shipments for six months this year total 3611, as against the entire year's total of 3480 in 1928.

Florida Increases Gas Tax

NEW YORK, July 8—Another increase in gas taxes has been made in Florida which has advanced its rate to 6 cents a gallon, thus making the second state to pass the 5-cent figure, according to announcement recently made by the National Automobile Chamber of Commerce. There has also been a bill introduced in the Georgia legislature, now sitting, to increase the gas tax in that state, and there is agitation there for a sales tax on automobile manufacturers and dealers. Such a bill, however, has not yet been formally introduced.

Exhibit Space Taken

CLEVELAND, July 8—Eighty-six per cent of the space available for exhibition at the National Air Races and Aeronautical Exposition to be held here Aug. 24 to Sept. 2, has been contracted for.

Bohannon and Smith Head Peerless Corp.

New President and Vice-President Outline Policy

CLEVELAND, July 10—On assuming office as president of the Peerless Motor Car Corp., James A. Bohannon, former vice-president of the Marmon Motor Car Co., told a representative of *Automotive Industries* that the new management is making a careful analysis of Peerless operating methods before announcing any changes. Citing the steady business the organization has enjoyed over a period of years as a manufacturer of quality automobiles, Mr. Bohannon stated that the company will continue to stick to the quality field and that the present line will go on uninterrupted.

"Mr. Smith and I have only been on the job three days. We are just nicely getting acquainted. We are, however, making a careful study of company policies and wherever we can see that a change will be of benefit, steps will be taken to see that the change is made," he said.

Mr. Bohannon was elected president of Peerless July 5, following the resignation of Leon R. German, who served a year as president of the organization. Don P. Smith was elected vice-president of the corporation at the same time, and it is understood that the two new executives will function as a dual management for the corporation.

Mr. Bohannon, who is 33 years old, had been associated with the Marmon company for seven years, entering its employ as purchasing agent. Later he became connected with the executive staff in charge of manufacturing operations. Earlier associations include a position as purchasing agent for the Savage Arms Corp.

Mr. Smith, who is 36 years old, was elected a director of the Peerless corporation at the annual meeting last April. He has spent his entire business career as a salesman and distributor for automobiles. After leaving the distribution end of the industry he made a special study of European markets and became associated with the Guardian-Detroit Co. in an advisory capacity, finally becoming assistant to the president and technical adviser on matters relating to the automobile industry.

The new officers of the Peerless Motor Car Corp. will begin their duties at once, and will function as a dual management.

In a statement issued following their election it was said:

"There is no intention of merging this pioneer Cleveland automobile company with any other organization building motor cars. Peerless is strong enough financially as well as in a manufacturing and sales way to stand on its own feet and make a remarkable success."

Detroit Aircraft Acquires Lockheed

DETROIT, July 8—Acquisition of a controlling interest in the Lockheed Aircraft Corp. by the Detroit Aircraft Corp. and extension of time for the deposit of stock by stockholders was announced today. At the time of the formation of the Detroit Aircraft Corp. a part interest in Lockheed was acquired and the opportunity to deposit their holdings was extended to all stockholders. Sufficient stock has been deposited to give the Detroit Aircraft Corp. control of the company and the remaining Lockheed stockholders have been given until July 20 to signify their intention of depositing stock. The basis of exchange is 1 1/3 shares of Detroit Aircraft Corp. stock for each share of Lockheed.

Detroit Aircraft also announced the acquisition of a 30-acre \$125,000 site for an airport at Long Beach, Cal. Establishment of a factory there by the company is expected to be announced soon. It is thought that this will be made the headquarters for the company's Pacific Coast operations, with the possibility that manufacture of Lockheed planes and operation of a flying service will be centered there.

Consolidated Sales Gain

NEW YORK, July 8—June sales of Consolidated Instrument Co. of America, Inc., were at the annual rate of \$845,000, as against the May rate of \$675,000, according to Joseph Leopold, president. Production during the current quarter will have a volume in excess of a million and a half dollars per annum, Mr. Leopold pointed out. All the company's manufacturing divisions are operating on an overtime basis, and additional plant facilities are being provided at each of its three factories. Unfilled orders as of June 30 are in excess of \$500,000.

Amtorg Corp. Orders American Tractors

NEW YORK, July 8—Orders for 6750 tractors with spare parts have been placed by the Amtorg Trading Corporation and Selskosojuus, Inc., with the International Harvester Co. and Deere & Co., according to announcement just made by Amtorg. Partial credits up to three years were extended by the tractor manufacturing companies in consummating this deal. Of this order 5900 tractors were purchased from the International Harvester and 850 from Deere & Co.

"Sky Fleet" Goes on Tour

WASHINGTON, July 8—An aerial tour covering 50,000 miles by the "Sky Fleet" of the General Tire & Rubber Co. was inaugurated recently when the flagship of the fleet was christened at Bolling Field. The eight ships which make up the fleet will be on tour more than six months in the interest of aviation.

To Attend Warsaw Meeting

WASHINGTON, July 11—Representatives of 50 nations are expected to attend the International Aeronautics Conference which will be held at Warsaw on Oct. 4, according to an announcement made this week by the Department of Commerce. Deliberations of the conference will be primarily for the purpose of obtaining the unification of aeronautical laws by means of the conclusions of respective international conventions.

Houdaille-Hershey Gets Bumper Stock

DETROIT, July 8—The committee constituted under the plan and agreement for combining the business of the Houdaille-Hershey Corp. and the General Spring Bumper Corp. has announced that deposits of General Spring Bumper stock have been made in excess of the amount required for the consummation of the loan, and that the plan has been declared operative.

It is expected that certificates for Houdaille-Hershey stock will shortly be available for delivery to the holders of certificates of deposit for General Spring Bumper stock, which have been issued under the plan and agreement. Although the time for accepting Bumper stock for deposit expired July 1, the committee has authorized the depositories to continue to accept the stock and to continue to issue certificates of deposit until the new Houdaille-Hershey stock is actually ready for delivery. There will be no formal extension for a definite length of time.

Crude Rubber Inactive

NEW YORK, July 8—Trading in crude rubber continues rather inactive, according to F. R. Henderson Corp., with prices fluctuating through a comparatively narrow range. Stocks in London were increased last week to 30,982 tons, while stocks in Liverpool increased to 4628 tons. Arrivals at all points in the United States during the first five days of July are estimated at 250 tons with probable arrivals for the month placed at 40,000 tons.

Russell Enlarges Warehouse

CHICAGO, July 8—The Russell Mfg. Co. has added 10,000 sq. ft. of floor space to its Chicago warehouse and branch office, making the total floor space available about 25,000 sq. ft., according to an announcement.

Calendar of Coming Events

SHOWS

International Aircraft Exhibition, Olympia, London	July 16-27
International Aircraft Exhibit, Coliseum, Chicago	Sept. 7-15
National Machine Tool Builders' Exposition and Congress, Cleveland	Sept. 30-Oct. 4
Paris, Automobiles	Oct. 3-13
London, Automobiles	Oct. 17-26
Prague, Automobiles	Oct. 23-30
Paris, Motorcycles	Oct. 23-Nov. 3
M.E.A. Show and Convention, Chicago	Nov. 4-9
N.S.P.A. Show and Convention, Detroit	Nov. 11-16
Berlin Auto Salon	Nov. 14
London, Trucks	Nov. 7-16
Paris, Trucks	Nov. 14-24
London, Motorcycles	Nov. 30-Dec. 7
Brussels Auto Salon	Dec. 7
New York National	Jan. 4-11
Chicago National, Coliseum	Jan. 25-Feb. 1

CONVENTIONS

National Association of Show and Association Managers, Meeting, Chicago	July 25-26
Second Pan-American Congress of Highways, Rio de Janeiro	Aug. 16-31

American Welding Society, Fall Meeting and Exposition, Cleveland	Sept. 9-12
American Institute of Mining and Metallurgical Engineers, Cleveland	Sept. 9-12
American Society for Steel Treating, Convention and Exposition, Cleveland	Sept. 9-13
American Chemical Society, Fall Meeting, Minneapolis	Sept. 9-13
A.S.M.E.—Iron and Steel Division—National Meeting, Cleveland	Sept. 11-13
Society for Electrical Development, New York City	Sept. 13
Eastern States Exposition, Springfield, Mass.	Sept. 15-21
American Electric Railway Association, Atlantic City	Sept. 28-Oct. 4
National Industrial Advertisers Assn., Cincinnati	Sept. 30-Oct. 2
National Safety Congress, Annual, Chicago	Sept. 30-Oct. 4
Penna. Automotive Association, Erie, Pa.	Oct. 7-8
Permanent International Association of Road Congresses, Sixth Session, Washington, D. C.	Oct. 7-11
Society of Industrial Engineers, Detroit	Oct. 16-18
National Hardware Association, Atlantic City	Oct. 21-24

World Engineering Congress, Tokyo, Japan	Oct. 29-Nov. 22
National Automobile Dealers Association, New York City	Jan. 6
National Automotive Dealers Association, Chicago	Jan. 27-28

RACES

Spanish Grand Prix	July 31
British Tourist Trophy Race	Aug. 17
Akron	Aug. 18
National Air Races and Show, Cleveland	Aug. 24-Sept. 2
European Grand Prix, Italy	Sept. 8
Syracuse	Aug. 21
Altoona, Pa.	Sept. 2
Cleveland	Sept. 1

S. A. E.

Aeronautic Meeting, Cleveland	Aug. 26-28
Production Meeting, Cleveland	Oct. 2-4
Annual Meeting, Detroit	Jan. 21-24

SALONS

Hotel Drake, Chicago	Nov. 9-16
Hotel Commodore, New York City	Dec. 1-7
Hotel Biltmore, Los Angeles	Feb. 8-15
Palace Hotel, San Francisco	Feb. 22-Mar. 1